

3. Leica Prototypes

The Leica I (in America the designation is 'A' and in England one often sees '1') was introduced at the 1925 spring fair in Leipzig, based on the Ur-Leica, the camera designed and constructed by Oscar Barnack between 1910 and 1913, but with significant improvements.

This date marks the beginning of the era of modern miniature photography, but the origins have to be traced a decade earlier.



3.1. Ur-Leica and Handmuster

Period; 1913/1914: Ur-Leica and prototype 1 and 2; the prototype 3 (Handmuster) is claimed to be made around 1920

Type; film loading 24x36

Top cover with accessory shoe for finder

Finder; Prototype 1 and 2: none or RASUK-type frame finder; prototype 3: fold down finder with negative lens element; Handmuster: Galilean telescope positioned above lens

Shutter speeds; prototype 1 and 2: 1/20-1/40 (1/25 – 1/50); prototype 3: Z-500-125-60-40-30-20

Shutter control and type; non-self-capping, mechanical, horizontal cloth

Film transport; manual by lever, rewind knob, mechanical

Measurements in mm; prototype 1: 128 x 53 x 28; prototypes 2 and 3 somewhat larger and close to the dimensions of the 0-series

Weight body (grams); 377

The three original cameras (only two have survived) were developed between 1913 and 1914, but it was only with a fourth version (Handmuster, 1920) that a number of problems were solved that the original prototypes had. The non-self-capping shutter that

was used at first required a rather cumbersome picture taking sequence and was not changed in the Handmuster model, but there were shutter-improvements.

The original lens had a focal length of 50mm (actually 52mm) and an aperture of 1:3.5. These characteristics were selected with a purpose: the Leica user had to guess the focusing distance and while photographers in those days were very good at guessing the distance with remarkable accuracy, Barnack could ensure that small errors in judgment at medium distances still produced sharp pictures with acceptable depth of field. The basic specifications of the camera does remind one of the point and shoot compact cameras of the 1970s. These cameras were designed to become permanent companions for recording events in daily life and this idea was also the driving force behind the efforts of Barnack to produce the camera that he internally named the Liliput camera because of its small dimensions. The Handmuster camera had dimensions 133 x 52.4 x 30.1, close to the Leica I measurements.



3.2. Null-series (Versuchs-serie)

Period; 1923-1924; serial numbers 100 – 131; total 26? Type; film-cartridge loading 24x36

Finder; fold down finder with swing-up front sight (first batch); fixed Galilean telescope (second batch);

Finder magnification; for Galilean telescope = 0.5

Rangefinder; separate

Shutter speeds; 25-50-100-200-500, third batch: Z-25-40-60-100-200-500

Shutter control and type; non-self-capping (last ten cameras: self-capping), mechanical, horizontal cloth

Flash synchronization; none

Film transport; manual by lever, rewind knob manual

Measurements in mm; 133 x 53 x 30

Weight body (grams); about 420

The Null-Series cameras (0-series) were improved versions of the Handmuster camera and were used to test the market. This 'test' however should be taken with some salt as the users were mainly Leica dealers and employees. The Null-series of cameras have become extremely valuable collector's items. The range of allocated serial numbers runs from 101 to 130, but some experts claim that the range started with 100 and that 31 pieces have been made. Additional research however indicates that there are some holes in the number range and that at most 26 camera have been manufactured. The first batch of 20 cameras has the non-self-capping shutter and later cameras have the self-capping shutter that is used in the Leica I. Therefore there is a separation between the serial numbers: 100 – 122 (Leica 0 or Null-series) and 123 – 130 (Prototype of Leica I). Below is the detailed list of cameras. The numbers 130 – 133 are presumably already Leica I models. Note that the first 45 Leica I cameras had been delivered to selected dealers for the Christmas 1924 sales. It is however not known when the cameras have been actually delivered to customers.

List of Null-Series cameras

100: not used
101: (A) Bauer, Leitz manager
102: Leitz junior
103: Kipper Berghäuser, Fricke/Rochester
104: Leica Museum
105: Dumar, Leitz director
106: Bereck ?
107: Leitz Patent, New York
108: Zack, Leitz manager
109: Leitz/Kutschinsky, Berlin, dealer
110: Kittner ?, Wien ?
111: Zeiler, New York, dealer
112: Barnack
113: Bergmann, Dr., Berlin, representative for Leitz
114: Klutze, Gießen, scientist
115: Kraft, William, Wiesbaden, dealer
116: no entry
117: test camera
118: Eicken, Prof. Berlin, scientist
119: Kipper Begasseur/Oberhausen
120: Bermann Berlin, dealer
121: no entry
122: Sauppe New York, dealer

123: no entry
124: no entry
125: no entry¹
126: Micael Becker, photographer
127: entry stroked through
128: Zack, Leitz manager
129: Winterhoff Gießen, dealer
130: not readable
131: not readable
132: not readable
133: not readable

The black-painted compact camera with its metallic body and collapsible, but fixed lens and the novel negative format was not an instant success. One of the main reasons, at least in my view, was the necessity to buy into and acquaint oneself with a full system with enlargers, developer tanks and new emulsions that behaved differently from the films used in the ubiquitous roll-film cameras.

In a catalogue of 1925 we read of an Reproduction Stand, a Minor Microscope, Developer Tanks, Printing Apparatus, several types of Enlargers, Film-Projectors, Tripod Head, Panorama Head, Stereo Slider, and a Close-Up Rangefinder. This last accessory is important because distance guessing gets more problematic at closer distances and many Leica motives are located in this close range. It is, by the way, a misunderstanding to state that Barnack at Leitz invented the 35mm film format or the 35mm camera.

3.3. The Kodak invention: movie film

At the end of the 19th century Kodak camera film was manufactured in 70 mm wide rolls for use in the Kodak Brownie camera. It was established that slicing this film in half lengthwise to a 35 mm width new smaller cameras could be made. This film with an image size of 18x24 mm that was perforated on both film edges, 64 times per foot, became the world standard for motion pictures and in 1909 was accepted as the norm by most movie film and movie camera manufacturers. Since 1910 practically every movie has been shot on this film format, often with the normal image size of 18x24 mm, but many other formats have been employed in movie cameras from 18 x 24 mm to 25.2 x 37.7 mm. Some

¹ Some authorities claim that real production started with serial # 125

Measurements in mm; 133 x 55 x 30.2 (original brochures say 132 x 55 x 30 mm)
Weight body (grams); 420 (with lens)

4.2. Leica I (C)

Of greater importance is the next model, introduced in 1930 that offered interchangeable lenses. Still called Leica I (but Leica C in America), the camera accepted lenses with focal lengths of 35, 50 and 135mm with apertures of respectively 3.5, 3.5 and 4.5. Every lens had to be individually adjusted on the body, a rather awkward procedure. (the lenses adjusted to a certain body received the last five (later last three) digits of the serial number of that body). A year later (1931) the company switched to standardized mounts (the camera name did not change) and introduced in addition: the 4/90, 1.9/73 and 2.5/50. This range of 35-50-73 (75)-90-135 became the classical range for decades to come.



Differences:
Code: LENEU
Period: 1930 - 1931; serial numbers: 37280 - 55403
Interchangeable lenses, individually adjusted
Period: 1931 - 1935; serial numbers: 55404 - 71199
Interchangeable lenses: standardized mount
Measurements in mm; 133.7 x 55 x 30.2 (standardized: 133 x 55 x 30)
Weight body (grams); 340 (without lens)

4.3. Leica I (B) Compur

Many contemporary cameras used leaf shutters that allowed slow speeds and Leitz introduced the Leica Compur (Leica B in America) in 1926 with speeds from 1 sec to 1/300. This model was ugly to say the least and it was not a big success: 1500 pieces in

4 years time. (start 1926: serial number 5701; end 1931: serial number 50711). Two versions have been made: a dial type shutter speed selection and a rim-set type shutter speed selection.



Differences:
Code: LECUR
Period: 1926 - 1931; serial numbers dial version (1926 - 1928) from 5701 to 13163; rim-set version: 1928 - 1931 from 13164 to 50711: total about 1500
Shutter speeds; dial: Z, D, 1-2-5-10-25-50-100-300;
ring-set: T, B, 1-2-5-10-25-50-100-300
Shutter control and type; mechanical, leaf shutter

4.4. Leica I (A) Luxus

A small number of cameras was made with a leather finish and in addition with matte gold plating. Here, by the way, we see the first instance of one of the strong points of the Leitz tradition: a focus on individual customer wishes and a forerunner of the à-la-carte program. The Luxus finish was applied to camera bodies of type Leica I fixed, interchangeable non-standardized and standardized and with Elmar and Hektor lens.

For Xmas 1929 Leitz offered the Luxus in several styles: with lizard leather in and a case with the same colors but crocodile leather). One should put this in the context of the economical realities of the period.

Differences:
Code: LELUX
Period; 1929 - 1931; serial numbers: 28692 - 68834: total between 60 and 100
Detailed numbers: 28692 - 28700; 34803 - 34817; 37134 - 37138; 37251; 37253 - 37262; 37265 - 37268; 37270 - 37272; 37274 - 37279; 37282; 48401 - 48441; 55696; 68601; 68834;



There is a prototype with a snapshot Elmar 4.5/35mm lens, that indicates its intended use. The price list from 1934 shows that the camera cost as much as the Elmar 3.5/50mm ! This Leica Standard should not be confused with the American Leica Standard that has been assembled in the New York branch of Leitz during and some time after the war and was based on the III-series.

Below is a New York version of the Standard



4.5. Leica Standard (E)

In 1932 Leitz introduced the Leica Standard, an improved version of the I (C), as a cheaper model compared to the Leica II (D), introduced in the same year. It should be noted that the postwar production was very limited.

The Leica Standard is not a retrograde model, but a fully up-to-date camera that shared all internal parts with the Leica II. Initially delivered in black and nickel. The later models were chromium plated. Basically the Standard is the continuation of the Leica I with some internal modifications, giving this camera type an official production run of 1925 to 1948.



Differences:
Code: LENOT (body); LEMAX (+3.5/50)
Period; 1932 - 1947; serial numbers: 101001 - 352150: total about 29000
Extendible rewind knob.

The Standard remained in the catalogues till 1948 and was for many the model that could be used as an entrance into the Leica system. Three versions: black and nickel; chromium plated; black and chrome.

the quoted production numbers and may be close to 135.000 or less. The camera is quite common, but the many wartime versions are a Valhalla for collectors. IIc cameras are quite plentiful and most wartime cameras are of this type. Later ones have ball-bearing shutters (like the IIc-K). Postwar models show a large number of small changes in top plate design and engravings, number of securing screws, type of vulcanite and quality of chrome plating. Internally Leitz used code numbers to identify the several types of cameras and these postwar models have codes: 1357/2357/2457/2467/2468. The match of type-codes to serial numbers indicate that Leitz did not produce the cameras in numerically chronological order. The department that set the allocation numbers for a certain camera type operates independently from the manufacturing and engraving departments that actually produce the cameras.

8.1. Leica IIId

This is a wartime model, made in 1940, just before the start of the production of the IIc, in very small quantities and offered an additional integrated self-timer (Prontor mechanism from Alfred Gauthier).



Differences:

Code: LOOTP, LLOIS, LOOUC, LAQOO, LOOWD

Period: 1940 – 1945; serial numbers: serial numbers from 360001 to 360100 (several batches have been identified: 360001 - 360020; 360040 - 360083; 360106 - 360134 and 367001 - 367500).

Presumably no one in these days needed or wanted such a feature and this camera stayed in the shadow.

ows of the IIc with a total allocated production of less than 300 units (a total of 427 has also been recorded). The self-timer did not return until 1954 when the second version of the IIIf was announced. The self-timer has always been a problematic feature because of the complex mechanical construction that is vulnerable to failures. The advantage of the self-timer is not great and it does give the Leica body a cluttered appearance. One is tempted to note that the Leica IIc and the Leica IIIf (1950) belong to the select class of the most elegant Leica bodies ever designed.

Some authors state that small batches have been produced during the war and delivered to Japanese Navy and US Army Signal Corps. Presumably these cameras were from the original batch, but it is easy to adapt a IIc to a IIId, so it may be possible that during the production of the IIc some cameras were fitted with the self-timer, a feature that automatically designated the body as a IIId. Very detailed lists of claimed serial numbers have been published. These lists identify serial numbers made or delivered in late 1944 and early 1945. It is unlikely that there has been any camera production in the years 1944 -1945, but presumably some assembly from spare parts might have been possible. According to internal documents, the series production of Leica cameras ended in the middle of 1943 when all equipment was moved out of the factory to safer locations.

9. Military models WW2

After the ascendancy of the Nazi Party in Germany since 1933, the industry had to adjust to a planned economy, slowly shifting production to support the military preparations for war. The photographic industry was not included, but the optical industry was and Leitz was no exception. The camera manufacture could continue to produce cameras for civil use and in 1935 introduced the Leica IIIa and in 1938 the Leica IIb, cameras that can be considered as the icons for a photographic era. The IIc, introduced in 1940, had the same functionality, but a different body design and a companion model with self-timer was also produced in very small quantities (IIId: between 300 and 500, some reports specify exactly 437 units). But the wartime demands did not favour this model (it added complexity without usability) and was quickly discontinued. From July 1940 there are many changes in the camera (different kind of curtain material, steel replaced brass, different shape of parts and so on), reflecting the difficulty in securing raw materials but also manufacturing problems. The war effort does influence civilian production: the many differences are a delight for collectors, but generally one should be very careful with the wartime cameras. During 1941 the camera production was significantly reduced and production became restricted to military models and repair/service. The camera production ceased in January 1944 (officially) and was resumed in May 1945. But in the two years 1943 and 1944 less than 2000 units were assembled.

During the period from September 1939 to January 1944 some 35.000 (or maybe less) cameras have been produced from serial number 360001 to somewhere between 391001 and 397611. Of this amount some 3300 were ordered by and delivered to the 'Reichsbeschaffungsamt' in Berlin, the central purchasing organization of the German Reich. Between end of 1939 and mid 1942 (factually and 1945 (formally) Leitz manufactured mainly the Leica IIc and a few IIb (the IIId is a minor exception). The factory lists show that in 1940 also the Standard and Leica II have been allocated for production.

Leitz delivered military models not only to the German Army, but also to the British and Italian Army.

Most cameras however went to the German Army and the majority (some 1800 cameras of type IIb and IIc) were finished in grey paint and delivered directly to the Air force with the additional inscription of 'Fl' (Flieger = airplane). Several batches were delivered to the Navy (some with grey-blue paint) and the standard grey was also for the rest of the army. Often these cameras got additional inscriptions that were done by the administrative units that received the cameras and there is no complete coverage of these engravings. A partial list is here: L, Fl-380792, K, WH, Luftwaffen Eigentum, Heer-Eigentum, SS KB, KB, 297, WaA and so on.

Additional information by diligent researchers⁵ (some spent more than 30 years on the topic of wartime Leica models) indicate that authentic Luftwaffe cameras were of type III, IIIa, IIb, IIc, IIc-K (some identified serial numbers are in the range 387103*K to 387435*K). How many of these have been produced or adapted is not exactly known, but Luftwaffe cameras were built into the airplanes from 1936 on.

Below is the grey version for the Luftwaffe (IIId)



The actual number of Leica cameras that have been delivered to the German Government cannot be established with certainty. The bureaucratic nature of the German Reich was no doubt a fact, but the many competing departments and officials created a veritable anarchy and no doubt many documents have been lost by war damage.

⁵ The documentation of the military Leica cameras is a minefield! The fascination of collectors for this type of equipment is not understandable from a techno-historical point of view.

with its additional complexity must have been a headache for the production engineers. Barnack must have been overjoyed by his original decision to design the body with a minimum of features. More complexity at the start could have been a hindrance for further development. The admiration for the genius of Barnack should be put in perspective of the day. The practical use of a Leica II or III is not a simple affair. One has to get used to the small viewfinder windows and one needs to have a very good feeling for the ambient light levels because a separate exposure meter distracts from the flow of picture taking.

The third column gives the normal figures, the fourth column has additional info and figures.

| Type | Comment | Units | Units |
|---------------------|--|-----------|-----------------|
| Ur-Leica | two bodies were built: one has been lost | 1 | |
| Prototype 3 | | 1 | |
| Handmuster | improved version of Prototype 3 | 1 | |
| Leica Versuchsserie | | 26? | |
| LEICA I (A) | Anastigmat 3.5/50 | 200 | |
| LEICA I (A) | Elmax 3.5/50 | 1200 | |
| LEICA I (A) | Elmar 3.5/50 | 56000 | |
| LEICA I (A) | close-focusing | ? | |
| LEICA I (A) | calfskin cover | 176 | |
| COMPUR-LEICA (B) | dial-setting | 640 | |
| COMPUR-LEICA (B) | rim-setting | 1100 | |
| LEICA I (A) | LUXUS | 60 -100 | |
| LEICA I (A) | Hektor 2.5/50 | 1330 | |
| LEICA I (C) | threaded lens mount | 3000 | |
| LEICA I (C) | standardized mount | 7300 | |
| LEICA STANDARD (E) | pull-up rewind knob | 29000 | |
| LEICA II (D) | coupled rangefinder | 52000 | |
| LEICA III (F) | slow speeds | 76000 | |
| LEICA 250 (FF, GG) | 250 exposures | 952 | |
| LEICA Röntgen | special camera with Xenon lens | 75 | New York ? |
| LEICA IIIa (G) | shutter speed 1/000 | 92000 | 800 black paint |
| LEICA IIIa | Monte en Sarre | 350 - 500 | |
| LEICA IIIb (G38) | close together eyepieces | 32000 | |
| LEICA 72 | 18 x 24 format | 40 | 150 ELC |

| | | | |
|-----------------------|--|-----------|----------------|
| LEICA IIIc-type 42215 | die-cast body | 138000 | 5 black paint |
| LEICA IIIc, IIIcK | grey paint | 3400 | |
| LEICA IIIc-type 42216 | die-cast body | 100000 | 85 black paint |
| LEICA IIIId | with self timer | 400 - 600 | |
| LEICA IIc | without slow shutter speeds | 11000 | |
| LEICA Ic | no viewfinder, no rangefinder | 12000 | |
| LEICA IIIIf | flash synchronisation, no self timer, black dial | 70000 | 1000 ELC |
| LEICA IIIIf | Swedish Military | 100 | |
| LEICA IIIIf | flash synchronisation, no self timer, red dial | 53000 | 1000 ELC |
| LEICA IIIf | without slow shutter speeds | 35000 | |
| LEICA If | no viewfinder, no rangefinder | 15800 | |
| LEICA IIIIf | with self timer, red dial | 55700 | 3400 ELC |
| LEICA IIIIg | bright line viewfinder | 41000 | 1800 ELC |
| LEICA Ig | no viewfinder, no rangefinder | 6000 | |
| LEICA IIIIg | Swedish Military | 125 | |
| LEICA IIg | prototypes, only one in Museum | 12 - 15 | |
| LEICA Ig | Post version | 70 | |
| LEICA If | black scale | 1200 | |



16. Leitz history: 1849 - 1949

On August 6, 1949 the Leitz Company celebrated a jubilee: the company could look back at a 100 years of history, beginning with the humble optical workshop of Carl Kellner in 1849. The Leitz Werke could sell every manufactured camera to a global market and production in 1949 equalled production in 1939: some 40000 cameras. The celebration showed not only cautious optimism, but also full confidence in the future that looked like a continuation of the past. Unaware of the developments in Dresden (the Contax D SLR with useful pentaprism) and in Japan, where Canon and Nikon were feverishly designing rangefinder cameras of advanced specifications and superior manufacturing quality, the Leitz management was reflecting on the future of the coupled rangefinder company, not to be sure to go for the IIIg or the M3 and disregarding the advice to develop a reflex camera.

The management at that time (not unreasonable) assumed that the current trend would be continued in the future. Nobody was prepared for the fact that the pace of innovation and the structure of the photographic market would change dramatically in the next decades. It is then natural to look back at the accomplishments of the past and extend the pattern into the future.



Above: factory around 1890

So let us look at the origins of the company. Every history about the Leitz Werke (Company) sketches a perspective of linear evolution from the beginnings as a cottage industry in Wetzlar around 1850 to a large manufacturing conglomerate in the 1950s. One may question this approach as it is evident that chance plays a major role in the development

of a company. It is by chance that Carl Kellner met Hensoldt in an optical firm during their learning years and that both were interested in the exploration of optical matters. It is also accidental that they could not find a suitable location for their workshop and at last ended in Wetzlar where family of Kellner could provide space for this workshop and financed the start-up company. It is accidental that Ernst Leitz visited Wetzlar and the ailing workshop of Belthle, the successor of Kellner. Wetzlar around 1850 was a small town (some 5000 inhabitants) but was till 1806 the home (again a stroke of luck) of the Imperial Chamber Court, the highest court in the country. This institute was visited by Goethe who lived for four months in Wetzlar and in the very same house that Kellner inhabited later. In 1818 the town gets the status of garrison town with a Prussian battalion (the location of the garrison is by the way the spot where the new Wetzlar Park will be erected). In 1962-1963 two railways connected Wetzlar with the rest of Germany and industrialization forged ahead, helped by 100 iron-ore mines in the neighbourhood.

16.1. 1848: first industrial revolution

The century between 1848 (German Revolutions) and 1933 (Nazi Party rises to power) has been rightly called the German Age. It was Germany where most technical inventions and scientific theories of the 19th century were developed and put into practice. Research activities in science and technique depended on a resourceful optical industry that could produce optical instruments of high precision. It is no coincidence that around 1850 many optical companies in Germany were founded, often as very small workshops that required only a small investment in equipment and machinery. Demand for optical instruments was high, supply however very limited and often of mediocre quality. The quality of the glass and the exactness of the polishing and grinding of glass surfaces was poor. In addition the practical knowledge of optical design (calculation of ray traces and the establishment of the refractive indices) was low and much experimentation was done in the form of tinkering ('prüfen'). There was a whole world to discover and to gather experience and knowledge.

The German school system demanded that pupils complemented their school period with a few years of practical training in several different companies, the so-called Wanderjahre. This was an excellent method for expanding knowledge and establishing relations with other companies. It was during this period of traveling around between companies that the trainees got advice about the best career to pursue. Many were advised to take up a career in optical design and construction. In 1846 Carl Zeiss followed this advice and in 1848 Hensoldt and Kellner, working together in a company in Hamburg got the same advice. After some excursions in several cities, they finally settled in Wetzlar and established the Carl Kellner Werkstatt in 1849. With this activity the optical industry in Wetzlar was founded and became a major player in the world of optics and cameras mainly under the Leitz banner. Kellner was not the only person who established an optical workshop in Wetzlar. Engelbert, Hensoldt and Seibert among others started between 1865 and 1873 their own optical companies. It so happened that all had family ties and knew each other very well and even worked in each others enterprises.

16.2. 1849 - 1869: Kellner and Belthle.

The Kellner Optical Workshop was a small company and Kellner focused primarily on the improvement of the ocular in which area he achieved success in improving upon the Ramsden type of eyepiece. As the ocular is also a major component of a microscope, it seemed natural for Kellner to expand his product range with microscopes that were optically good, but mechanically rather simple although with good manufacturing quality. Kellner did not sell many microscopes, but established a good reputation, a basis on which Leitz could continue to improve the quality of the product. The cottage workshop employed at most 12 assistants and apprentices when Carl Kellner died in 1855. One of his assistants, Fr. Belthle, married the widow and became the owner of the workshop, but he could not expand the company and in fact the enterprise was practically moribund. Ernst Leitz became focused on the Kellner workshop by accident on a recommendation by a colleague. There was no family relationship between Leitz and

the owner of the Workshop (Belthle). Ernst Leitz started in the workshop as a companion in 1865 and later, in 1869, acquired the assets.

16.3. 1869 - 1925: Leitz Werke

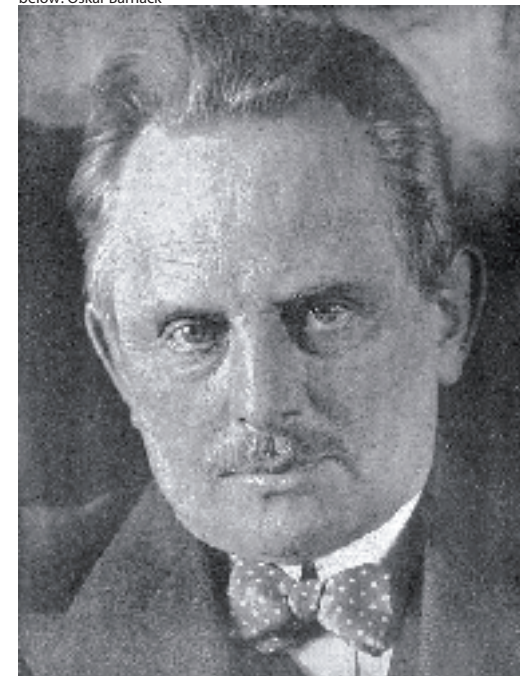
Leitz was lucky to start his company in a period of economic prosperity and scientific growth which generated a substantial demand for high-quality microscopes and related optical equipment. His company had to compete with others that were founded around 1850, in particular the Carl Zeiss Werke. After the French-Prussian war of 1870 demand soared and Leitz had to fight on three fronts: product expansion, reorganization of the factory and manufacturing processes and fend off formidable competition in Germany but also globally in all export markets.



Leitz managed the company with a steady hand and the workforce expanded from 20 persons in 1870 to 2000 in the war period (1914 - 1918). In 1919 the workforce was reduced to 1100 persons and stayed on that level during the recession that stigmatized the Weimar Republic (1918 - 1933).

Hyperinflation ended in 1923/24 and a short period of relative stability and prosperity began until 1928 when the world wide depression began with the 1929 stock market crash. The Leitz company could not grow fast enough with its existing range of products and was looking for new products and markets. An obvious candidate was the booming market for movie projectors. The culture of the Weimar Republic was heavily dominated and even saturated with a fascination for modern technology and modernism in general. Cinematography offered modern technique and the illusion of speed (a major theme in European culture of that period). The number of movie theatres all over Europe grew at a very fast rate and the demand for movie projectors grew proportionally. Leitz was certainly aware of the possibilities and chances and had the opportunity to hire Mechau who worked on an improvement for the movie projector. This product was manufactured since 1919 by Leitz but relatively soon the production facilities were sold to AEG, because the Mechau could not be adapted to sound movies.

below: Oskar Barnack



Around 1914 another product came to the attention of Ernst Leitz. It was a small photographic camera, loaded with movie film that could be used at eye

level and could expose about forty pictures on one roll of film. The camera was created, designed and constructed by Oskar Barnack who worked at Leitz as an engineer and was involved in the Mechau project. Innovations do not occur in isolation and we have to take a look at the Fin de Siecle period (1900 - 1914) to sketch the environment and impulses that influenced Barnack when designing the Ur-Leica. The origins of this camera are still discussed, but for a description of the history of the Leica camera it will suffice to say that Ernst Leitz was quite impressed with the new photographic possibilities of the camera and that Barnack got permission to create a pre-production model, the 0-series, in 1923/24. Ernst Leitz took some risk when he decided to produce the camera. How great that risk was in reality we do not know. The existing production facilities could be adapted to the demands of the camera manufacture and the skills of the workers in the microscope division were not very different from what the camera production needed. On the other hand there were many new components that had to be manufactured and new machinery had to be installed and a new workflow had to be put in place. My personal view is that Ernst Leitz simply liked the camera and discarded any contra-arguments as he wished to produce the camera because he believed in its success. Important decisions are not rational but based on feeling!

The invention of the Leica is often portrayed as a single act by a visionary engineer. This view ignores the fact that inventions are children of the Zeitgeist. Officially the automobile has been invented by Carl Benz in 1886. In reality there were several persons working on the same idea, before and at the same time as Benz. The invention of the 35mm camera by Barnack was certainly a stroke of genius, but many others were involved and working at the same idea. Barnack had at least two colleagues in the factory who supported and helped him with mechanical solutions and technical details. It is known that Barnack was excellent in sketching new ideas but not so good in transforming ideas into functioning parts.

The Ur-Leica from 1914 was functioning quite well, but there were a host of technical details to solve and it took Barnack and his colleagues a full decade to solve them.



There is much mythology around the Leica M3, mostly generated by collectors and admirers: there is a persistent claim that the M3 models with a serial number above 1.100.000 are the best. The evidence for this statement is never provided and one might assume that the argument behind the claim is based on the idea that in the last production years all problems have been fixed and the trained workforce is at its best.

It is also claimed that the M3 (and the M2/M4 are included as well) are the best engineered and finest M-cameras ever made. There is no denial that the smooth and silent operation of the M3 is unsurpassed and hardly equalled. The material used for the gear-trains in the M3 is a softer metal and the elaborate surface treatment ensures an excellent mesh of the tooth flanks. Last but not least the careful assembly and the final adjustments by dedicated craftsmen might produce the finishing touch. The special version with olive green paint has been made for the German Army.

Even fifty-year old M3 cameras can be serviced today and restored to an 'as-new' condition. Early advertisements from Leitz stressed the fact that the purchase of an M3 is a "lifetime investment in perfect photography". It is evident that the designers and engineers in the Leitz company did not assume that their products would have a technical lifetime of a half century. It is common practice that technical products are designed for a limited life span, but with high reliability and durability. The M3 has been designed with almost unlimited replacement of parts and numerous vital adjustment possibilities. It is reasonable to assume that the engineers based the construction on a life expectancy for the camera of 15 - 20 years or more than 5000 - 10000 rolls of film (or 150000 - 300000 exposures). Manufacturing technology in those days was not supported by sophisticated stress and failure analysis and prudent engineers calculated with a large safety margin. Even gears that are hardly subjected to stress are

over-dimensioned. Given the fact that the even the latest M3 bodies are now well beyond the calculated life span, it is inevitable that defects will occur (vulcanite becomes brittle, rangefinder glass colours yellow and so on).

On the other hand it is also possible to have the M3 serviced and enjoy the possession and use of one of the great classics in camera history.



Above is an early version of the M3 (no frame selector, 4-screw bayonet).

Below a semi-nude M3 camera.



18. LEICA M2 to M4-P

Photojournalism and candid street photography in the 1950s started to follow the adage of Robert Capa (if your picture is not good, you are not close enough) and demand for the focal length of 35mm increased. The design of the rangefinder of the M3 did not allow for a wider view and the option of a lens with additional spectacles was costly and not very elegant. Leitz designed a new rangefinder with a magnification of 0.72 to match the angle of view of a 35mm lens. This construction was incorporated into the M2 camera, still with three frames (35-50-90) that was introduced in 1957 with serial number 926001. Production ended in 1968 with # 1207000.

18.1. Leica M2

The M2 is interpreted by most experts as a lower-cost simplified model, compared to the M3, but this is not true. The shutter was a redesigned unit compared to the one in the M3, but not less sophisticated and certainly not much cheaper to manufacture. Shutter speeds follow the international norm of 1-2-4-8-15 and so on). The M2 initially lacked the self timer and the self-resetting film frame counter, but later models (from # 1004150) included the self-timer. Weight is 580 grams. The price difference between a M3 and M2 was about 15% in 1965 (body only: M2: DM 650 and M3: DM 756). One might also look at it this way: for about the same price, one could buy an M3 with Summicron 2/50 or an M2 with Summilux 1.4/50mm.

The M2 could be fitted with a special 135mm lens with spectacles that had a 1.4 magnification and coupled with the rangefinder.

Leitz did not mention the difference in price as a sales argument, but stressed the fact that the M2 is the wide-angle camera and the M3 the universal one. Presumably they hoped that Leica-photographers would buy both.



A special and interesting aspect of the viewfinder (M3 and M2) was the optical depth-of-field-indicator or zone focus indicator: there are two small

cut-outs at the top and bottom of the rangefinder field that give a visual indication of the zone of sharpness. When the separation of the rangefinder images is less than the width of the upper (wider) cut-out the object is still sharp when the aperture is 1:16. When the separation of the rangefinder images is less than the width of the lower (narrower) cut-out the object is still sharp when the aperture is 1:5.6. It is an ingenious solution, but in practical use not very convenient because it was restricted to the use of the 50mm lens, so it disappeared without much notion.

In the ten years of its production life the M2 sold some 84000 units from Wetzlar and another 1600 from Midland. The M2 has been made in three versions (without self-timer and a button for film rewind release; without self-timer and a lever for film rewind release; with self-timer and lever for film rewind release).

In USA two more models are known: M2-M for use with the electric motor-drive from Leitz New York and M2-R (with rapid film loading mechanism from the M4 model). These are civilian versions of the original M2-R (specifically made for the US Army). Some M2 cameras have been made in Midland, Canada. In the USA the M2 has been also advertised as M2S with self-timer and M2.X without self-timer. The main components of the Leica M2 (shutter design and finder mechanism) constitute the roots of every film loading Leica M till the current MP and in this respect the Leica M2 is the true source of all Leica CRF models.

The M2 has also been made in olive green as a military version and as Luftwaffe grey for the German Airforce.

Below is an inside view of the construction of the Leica M2.





Model: Leica M2

Period: 1957 - 1968 (serial numbers: 926001 – 1207000)

Type; film-cartridge loading 24x36

Finder; bright-line range- and viewfinder with automatic parallax correction

Rangefinder base-length; 69.25

Finder magnification; 0.72

Frame lines; 35;50;90; (135 with additional spectacles on dedicated 135mm lens)

Finder indications; rangefinder spot, frame-lines

Rangefinder; manual, mechanical, contrast and split image measuring method

Exposure meter; none, external exposure meter coupled to shutter speed dial

Exposure handling; manual selection of speed and aperture, additionally clip-on meter with needle alignment

Meter sensitivity in LV; none

Film speeds (ISO); film speed reminder dial

Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash), 1/60, 1/125, 1/250, 1/500, 1/1000, B

Shutter control and type; mechanical, horizontal cloth Flash ; X and M sockets

Flash synchronization; 1/50

Film transport; manual by lever, rewind knob, mechanical

Measurements in mm; 138 x 77 x 36

Weight body (grams); 580

18.2. Leica M1

The Leica M1 is a simplified version of the M2 without a coupled rangefinder, but with two fixed parallax-corrected frames in the finder with the field of view for the 35mm and 50mm lenses, external film counter and shutter speeds from 1 sec to 1/1000 and two flash outlets. (Total: some 10000 units). The camera was dedicated for scientific work

with microscopes, copy stands and so on. The price differences in 1960 between the three M cameras (body only) are substantial: here the price in English pounds: M1: 57; M2: 87; M3: 108 (currency conversion for US dollars in 1960 prices: 1 USD = 0.36 GBP or 1 GBP = 3.05 USD = 2.36 EURO). The M1 has also been manufactured in olive green paint for the German Army. An M1 without viewfinder has been identified as a prototype for the MD-series.



Model: Leica M1

Period: 1959 - 1964 (serial numbers 950001 – 1102900)

Type; film-cartridge loading 24x36

Finder; bright-line viewfinder with automatic parallax correction

Rangefinder base length; no rangefinder

Finder magnification; 0.72

Frame lines; 35, 50

Finder indications; frame lines

Rangefinder; none

Exposure meter; None, external exposure meter coupled to shutter speed dial

Exposure handling; manual selection of speed and aperture, additionally clip-on meter with needle alignment

Meter sensitivity in LV; none

Film speeds (ISO); film speed reminder dial

Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash), 1/60, 1/125, 1/250, 1/500, 1/1000, B

Shutter control and type; mechanical, horizontal cloth Flash ; X and M sockets

Flash synchronization; 1/50

Film transport; manual by lever, rewind knob, mechanical

Measurements; 138 x 77 x 36 mm

Weight body (grams); 545

18.3. Leica M4



Model: Leica M4

Period: 1967 – 1975 (Serial number:1175001 – 1443170)

Type; film-cartridge loading 24x36

Finder; bright-line range- and viewfinder with automatic parallax correction

Rangefinder base length; 69.25

Finder magnification; 0.72

Frame lines; 35, 50, 90, 135

Finder indications; Rangefinder spot, frame lines

Rangefinder; manual, mechanical, contrast and split image measuring method

Exposure meter; None, external exposure meter coupled to shutter speed dial

Exposure handling; manual selection of speed and aperture, additionally clip-on meter with needle alignment

Film speeds (ISO); film speed reminder dial

Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash), 1/60, 1/125, 1/250, 1/500, 1/1000, B

Shutter control and type; mechanical, horizontal cloth Flash ; X and M sockets

Flash synchronization; 1/50

Film transport; manual by lever, rewind crank, mechanical

Measurements; 138 x 77 x 36 mm

Weight body (grams); 600

In the 1960s the advance of the system-SLRs continued if not exploded and the demise of the CRF-biotope was imminent. Zeiss had stopped the production of the Contax and Nikon was slowly pulling out. Canon continued to explore and expand the CRF system, but discovered that the SLR was the more popular and profitable system. Even Leitz had to succumb to the demands of the market and produced, with characteristic conservatism, the Leicaflex in 1965.

The production of the M2 and M3 side by side was an expensive undertaking and sales of both models were dwindling after 1965. Faced with the choice to abandon the CRF domain or to try to revive the sales, Leitz created a camera with enhanced features to appeal to the photo-journalist and reportage-maker. A new rapid three-pronged film loading system, a redesigned film advance lever and a rapid rewind crank did increase the speed of operation. The viewfinder now incorporated four frames for 35, 50, 90 and 135 mm lenses, the preferred focal lengths for the CRF camera.

The rest of the specifications is identical with those of the M2, indicating that the Leitz engineers could not find room for really new improvements since 1957. One has to add that the concept of the Leica could hardly be improved without a radical change. The Leica M5 was the result of several years of research into a new approach. This camera was announced in 1971 and one may assume that most research potential was diverted from the M2/4 to the M5. From this viewpoint one could remark that the M4 is more a stopgap model than the last of the true classical rangefinder models. Rationalization of production and cost reduction would be the cause of the limitation of the M-product range.



There have been black (chrome and paint) and silver-chrome versions and one of the first batches (1185001 - 1185150) was adapted for a motor-drive and finished in black. Identification is Leica M4 M and later some more batches, specifically for the USA market, were produced with the designation M4-Mot: 1206737 - 1206891; 1248101 - 1248200; 1267101 - 1267500; 1274001 - 1274100. Some of the earliest batches and some of the latest

batches have been produced in Midland, Canada (1178001 - 1178100; 1183001 - 1183100; 1382051 - 1382600; 1412551 - 1413350). Some 57000 M4 cameras have been made and in addition some 2400 were assembled/produced in Midland, Canada. The M4 has a special editions: M4 50 Jahre to commemorate the fact that in 1975 the Leica camera was 50 years old. The Leica KE-7A is a special version for the US Army: 1971-1972, made in Canada: total number of cameras is not known. An olive green painted version has also been produced for the military.

18.4. Leica M4-2



Model; Leica M4-2
Period; 1977 - 1980 (Serial number: 1468001 – 1533350 (a very rare silver-chrome version).
Type; film-cartridge loading 24x36
Finder; bright-line range- and viewfinder with auto-matic parallax correction
Rangefinder base length; 69.25
Finder magnification; 0.72
Frame lines; 35;50;90;135
Finder indications; Rangefinder spot, frame lines
Rangefinder; manual, mechanical, contrast and split image measuring method
Exposure meter; None, external exposure meter coupled to shutter speed dial
Exposure handling; manual selection of speed and aperture, additionally clip-on meter with needle alignment
Meter sensitivity in LV; none
Film speeds (ISO); film speed reminder dial
Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash), 1/60, 1/125, 1/250, 1/500, 1/1000, B
Shutter control and type; mechanical, horizontal cloth

Flash ; X and M sockets
Flash synchronization; 1/50
Film transport; manual by lever, rewind crank, mechanical
Measurements; 138 x 77 x 36 mm
Weight body (gr); 525

Leitz had sold the majority stake in the company to Wild-Heerbrugg in 1973/1974. It was evident that Wild-Heerbrugg had absolutely no interest in the photography division. The camera unit within Leitz was struggling with the disappointing sales of the Leica M5 and CL models and the strong competition in the SLR field, where the Leicaflex SL was defending the honor without great success. Wild-Heerbrugg did not release the required funds for new camera models and Leitz had to make two decisions: (1) abandon the production of the CRF cameras and (2) cooperate with Minolta in the SLR domain for the introduction of cameras that could be manufactured at less cost. There still was a small group of supporters of the CRF camera construction and a restart was planned in Midland. Equipment, tooling and personnel were transferred from Wetzlar to Midland and in 1976 the Leica M4-2 was announced and produced in a smaller batch of 2100 units. There is at least one M4-2 with one higher serial number (# 1586351, a commemorative engraved 'Everest'). Some 17000 have been allocated, but it is questionable whether this total amount has actually been manufactured. The M4-2 shares all specifications with the M4, but lacked the self-timer. The film-type reminder device is rather unique with the possibility to use it with a pencil as a kind of notepad. The M4-2 has a hot shoe for X-synchronization where the M4 just offers a accessory shoe for the clip-on exposure meter or additional viewfinders. The weight is officially 525 grams, but the real weight is closer to 700 grams. . The M4-2 underwent several changes in the inscriptions on the top cover (Leitz Wetzlar, Made in Canada or Leitz on the top and Canada at the back of the top cover). The M4-2, at least in the early period had minor problems that required some adjustments, but basically the camera is as good as an M4. The childhood illnesses at the start had to do with the fact that the workforce at Midland had to learn how to operate the tooling machines and the assembly of the camera. Once they had mastered the craft,

the M4-2 has impeccable finish. Internally some cost-cutting is visible, simplifying parts in order to compensate for the important finish: heat-treating of surfaces and the selection of low-friction mating pairs. The fact that the M4-2 can be coupled to a motorized power winder may be one reason for this low-friction operation.

The M4-2 was framed as the silent, unobtrusive, compact camera designed for power winder use (the Leica winder M4-2) with high-speed lenses, among them the Canadian designed Noctilux 1/50 mm. The accuracy of the rangefinder mechanism for the preferred focal lengths of 35mm to 90mm was particularly emphasized and its niche position clearly demarcated. The all-black M4-2 with motor winder and Noctilux made an impressively beautiful impression, but the conspicuously visible red Leitz logo on the front was not applauded by the street and reportage photographers who often black-taped it. This cult of taping became a kind of hall-mark for serious Leica M photographers. There is a gold model of the M4-2, allocated in 1993 (!) (1932001 - 1932002), but also many copies! In 1979 the special gilded edition with engraving Oskar Barnack 1879 – 1979 was issued with 1000 units and special serial numbers.



18.5. Leica M4-P



Model; Leica M4-P
Period; 1980 - 1986 (Serial number 1543351 - 1692950 with a batch of 1000, made in Wetzlar!).
Type; film-cartridge loading 24x36
Finder; bright-line range- and viewfinder with auto-matic parallax correction
Rangefinder base length; 69.25
Finder magnification; 0.72
Frame lines; 28-90; 35-135; 50-75
Finder indications; Rangefinder spot, frame lines
Rangefinder; manual, mechanical, contrast and split image measuring method
Exposure meter; None, external exposure meter coupled to shutter speed dial
Exposure handling; manual selection of speed and aperture, additionally clip-on meter with needle alignment
Meter sensitivity in LV; none
Film speeds (ISO); film speed reminder dial
Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash), 1/60, 1/125, 1/250, 1/500, 1/1000, B
Shutter control and type; mechanical, horizontal cloth
Flash ; X and M sockets
Flash synchronization; 1/50
Film transport; manual by lever, rewind crank, mechanical
Measurements; 138 x 77 x 36 mm
Weight body (grams); 545

In 1980 the Leica M4-P was introduced and at the same time the Leica R4 was launched. The Leica M5 had sold more than 33000 times and the M4-2 came close to 20000. Leitz then did assume that there was a world-wide demand for at least 20000 units and with proper calculations could manufacture an improved model. In the late 1970s and early 1980s every serious SLR camera offered a potent mo-

tor-drive, but these cameras with its many moving parts were not silent and in the pre-AF age fast accurate focusing was not easy. In these areas the Leica CRF had convincing advantages: extremely silent, fast and accurate focusing with high-speed lenses and a new silent winder. The M4-P was advertised as the camera with stealth-properties and rapid operation with the bright and contrasty viewfinder, small size and excellent high-speed lenses. The 0.72 x viewfinder construction had from the start enabled the viewpoint of a 28mm lens, but Leitz offered this option only with the M4-P. The 28mm focal length was popular in street photography and threatened to dislodge the 35mm as the premium lens for humanistic photography. The M4-P is an M4-2 with six frames for 28/90; 50/75 and 35/135mm lenses, still manufactured in Midland. The factory had improved the manufacturing quality and had become as good as the old Wetzlar assembly lines. The 75mm lens was a new design with which Leitz hoped to attract new buyers. Several competitors offered lenses with focal lengths in the range 85 – 90 mm and apertures of 1.2 – 1.4. Leitz could not create a 90 mm lens with a maximum aperture of 1.4 within the optical and mechanical constraints they had set for themselves. The compromise was the Summilux 1.4/75mm.

The specifications of the M4-P are not only almost identical to the ones of the M4 from 1967, but also very unassuming in comparison with the lavishly equipped Japanese SLR-cameras. Leitz simply did not have the capital reserve (or Wild Heerbrugg did not provide them with the financial resources) required for the necessary retooling of machinery to take advantage of the technological progress made in the 1970s. Thus Leitz had no choice but to stay within very narrow boundaries for improvement, dictated by the engineering flexibility of the existing machinery.

The M4-P has shutter speeds of B, 1-2-4-8-15-30-(50)-60-125-250-500-1000 (in-between times cannot be selected!), body dimensions 138 x 77 x 36 mm, weight of 545 grams, X and M sockets (for flash synch to 1/500 with flash bulbs!). A completely outfitted camera with motor winder, Summilux 1.4/50mm and Leicameter MR weighs close to 1.5 kilogram!

Special models are: M4-P 1913 – 1983 (1983: special serial numbers, 2500 pieces); M4-P Everest (1982: with Mount Everest logo: 200 pieces); M4-P Half

Frame: 13 pieces identified).

The M4-P was the last of the classical mechanical rangefinder cameras, made by Leitz. The next model, the M6 incorporated a TTL-exposure meter and some electronics. The M4-P could be fitted with the external clip-on exposure meter, made by Metrawatt. This meter coupled with the shutter dial and could be used as an incident light-meter.



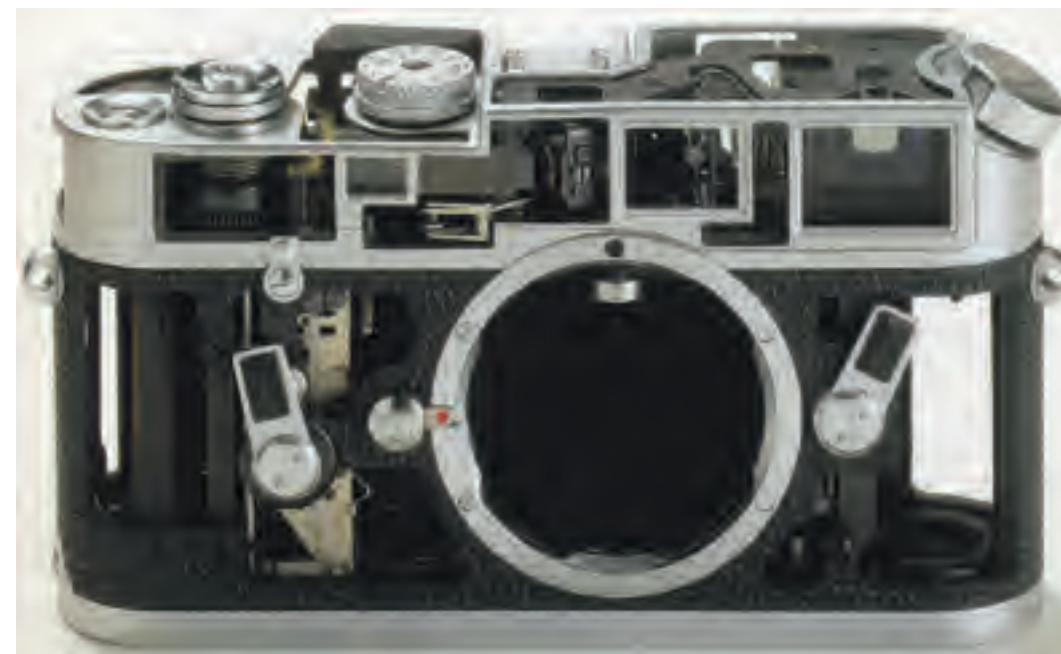
Transition from M2 to M6

The Leica M2 is the progenitor of all Leica M rangefinder models whose main features can even be recognized in the Leica Monochrom. Many Leica fans admire the M3 for its ultimate smoothness and civility and criticize the industrial sturdiness of the M2 and its successors from M4 to M6.

The internal changes between M2 and M6 are substantial. The outward appearance on the other hand shows the subtle evolution best seen in these drawings.



Here you see the M4 and the M6 in semi-nude condition. The similarities in design and also the differences in construction are clearly visible.



Model: MP

Mode: 10 302 (0.72 black paint); 10 301 (0.72 silver chrome) Period: 2003 - current (2012); serial numbers: 2880101 - current (2012) Weight body (grams): 585



Above the black painted MP; below the silver chrome



Some special versions of the M6 can be seen below.

Below: the rather rare Panda edition



Below the M6 with standard front inscription



Below: the M6 with rare front inscription



This is the cover of the brochure 1989.



20. LEICA M6TTL to LEICA M7

In the 1990s the new method of automatic fill-in flash became common practice. Sophisticated exposure measurement systems and electronic processing in reflex cameras solved the problem of manually calculating flash exposure and produced natural looking pictures in strong back light. Flash technology had always been a suppositious child in the Leica philosophy of available light photography. Leica however had to incorporate this facility in the M6 to keep the camera attractive. Their brochure for the M6TTL tries to combine subtle flash techniques with low ambient light photography.

An additional SPD cell for flash-metering in the bottom of the lens mount chamber and some circuitry is all that is needed to provide full TTL-flash technology with flash indications in the finder. The TTL-flash system is certainly not as comprehensive as the one in the R8 from which the M6TTL has borrowed some parts and ideas. The M6TTL added a new larger shutter speed dial with computer-styled numerals of greater legibility, but the dial turned in the 'wrong' direction compared to previous models. The change in direction was deemed necessary to follow the direction of the LED pointers in the finder. One minus point for the M6TTL is the limited support for flash equipment (dedicated SF20, SF24d and some Metz SCA units). With adapter and a large Metz flash unit the camera becomes more conspicuous and less easy to handle. The system works fine however in controlled studio situations.

The M7 is the most automatic of all film-loading M-cameras. The shutter speeds are controlled by electro-magnets, but the shutter itself is fully mechanical. In case of battery failure only two much-used speeds (1/60 and 1/125) are available. The accuracy of the shutter is excellent, best of all horizontally running cloth curtain shutters in M-bodies and operates with greater silence especially at slower speeds. The M7 is the first Leica M that recognizes DX coding, offers high speed flash synchronization till 1/1000. The finder indications include shutter speeds when in automatic mode and this readout is a marvel of miniaturization, measuring 0.7 x 2.3 mm and having 33 different segments. The M7 offers

aperture-priority automation and in this respect matches the functionality of the Konica Hexar RF and the equally short-lived Zeiss Ikon camera, remotely related to a Bessa camera.

After the Contax G1/G2 Zeiss made a second effort to become a major force in the rangefinder market with the Zeiss Ikon model, closely emulating the M7 features. An outstandingly good view/rangefinder, a very beautiful body shape and excellent finish were coupled to some of the best lenses ever made for CRF cameras, showing Leica that Zeiss optical design is still top-notch.

The M7 has survived all competitors and this is rather amazing when one considers that the functional profile is almost identical. The M7 itself however has been commented upon as offering too much automation and to stray from the true Leica DNA, a kind of Frankensteinian approach by Leica so to speak. What seems to be a question mark when discussing classical mechanical Leica cameras has been fully accepted and enjoyed when we move into the digital world where the M8 and M9 offer even more automation (motorized transport, TTL-flash with GNC/pre-flash, aperture-priority automation, full-electronic metal multi-blade vertically running shutter). In this perspective the new branch of Leica CRF cameras starts with the M7 and to be a little bit more tolerant, one might say that the M6TTL is the father of all modern Leica CRF cameras, the MP being the sole standard bearer of the classical line.



Model; Leica M6TTL

Code: 10475 (0.58 black chrome); 10474 (0.58 silver chrome); 10433 (0.72 black chrome); 10434 (0.72 silver chrome); 10436 (0.85 black chrome); 10466 (0.85 silver chrome);

Period; 1998 - 2003; 2466101 - 2760000 (total some 48500); M6 TTL HM: 2000 - 2000; 2554501 - 2688800

Rangefinder; none
Exposure meter; none
Exposure handling; manual selection of speed and aperture
Film speeds (ISO); film speed reminder dial
Shutter speeds; 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50 (flash) 1/60, 1/125, 1/250, 1/500, 1/1000, B (post models 1/50 only)
Shutter control and type; mechanical, horizontal cloth
Flash ; X and M sockets
Flash synchronization; 1/50
Film transport; manual by lever, rewind knob, manual
Measurements; 138 x 77 x 36 mm
Weight body (grams); 545



Loading the camera with a strip

There is an investigation by historian Pierre Jeandrain that the earliest Postcameras with serial numbers pre-dating the official start of the MD-series are in fact adapted M3 bodies, so called ‘Sonderausführung’ and should be referred to as M3-Post. The actual numbers of ‘Postcameras’ that have been allocated or made is difficult to ascertain. The Leica camera lists have entries for the Post-versions in the several formats, but it is not known if there are Post-versions among the standard MD/a/2 types and corresponding serial number ranges.



21.8. Rare Leica M cameras

Below is a listing of some rare and some standard Leica M cameras. The list is certainly not complete and serves an illustrative purpose.

| Type | Comment | Units |
|--------|--|-------|
| M3E | silverchrome for Eisenstaedt | 1 |
| MD22 | MD-2 with 18 x 24 mm | 1 |
| MPE | silverchrome for Eisenstaedt | 1 |
| M4-2 | Gold | 2 |
| M3D | black paint for DDDuncan | 4 |
| M1 | hammered grey, ELC | 10 |
| MD | hammered grey | 10 |
| MS | hammered grey | 10 |
| MP | silver chrome | 11 |
| M2 | Luftwaffe | 20 |
| MP2 | chrome and black paint, some with electric motor | 27 |
| M4 | olive green | 31 |
| M4 | black with Reproniek | 50 |
| M3 | Prototype | 65 |
| M4-2 | black with red logo | 95 |
| MP | black paint | 139 |
| MDa | with flash control | 200 |
| M1 | olive green | 208 |
| M3 | olive green | 214 |
| M3 | Betriebskamera | 250 |
| M2 | MOT | 276 |
| MP | silver chrome | 298 |
| M6 J | special anniversary camera (M3J) | 400 |
| M4-KE7 | ELC | 550 |
| M4-P | ELW | 1000 |
| M4 | MOT | 1040 |
| M2 | black paint | 1150 |
| M6 | Platin | 1250 |
| M3 | black paint | 1320 |
| M4 | ELC | 1550 |
| M2 | Canada | 1680 |
| MD-2 | | 1800 |
| M2R | also known as KS-15 (4) | 2000 |
| M4R | ELC | 2000 |
| M6 | Black paint | 2000 |
| M2 | with large negative frame gate | 2200 |

| | | |
|--------|--------------------------------|---------|
| MD | | 3200 |
| M4 | black | 5000 |
| M4 | paint | 5400 |
| M3 | ELC | 7100 |
| M2 | Delayed action | 7300 |
| M5 | black paint | 7500 |
| M1 | | 9500 |
| M5 | silver chrome | 10800 |
| M4-2 | | 14100 |
| MDa | | 14900 |
| M5 | black chrome | 16150 |
| M4-P | ELC | 24200 |
| M6 | includes some special versions | 25200 |
| M4-2 | chrome, many falsifications | 1 - 10 |
| MDa | MOT | 10 - 25 |
| M6 TTL | several versions | 49000 |
| M6 | silver chrome | 52000 |
| M6 | black chrome | 54400 |
| M4 | | 58200 |
| M2 | standard | 74000 |
| M3 | | 218000 |
| M1 | ELC | ? |
| M3P | Cartier-Bresson and others | 2? |

22. LEICA M8 and M8.2

At the start of the new millennium (2000) market research and sales volumes predicted that the next victim of digitalization would be silver-halide emulsions for photographic purposes. It is a widely popular misunderstanding that Leica slumbered away during the digital transformation. Early in the 2000s Leica engineers were actively involved in digital technology, notably the Digital Module for the R-camera. The general thinking within the company assumed that the core values and the core image of the Leica brand was intimately connected with the classical rangefinder with the silent shutter and the unique properties of film as the recording medium. The experience with the DMR however signalled problems for the M-camera because of its short back focal length. Many lenses in the M-system had steep angled edge ray bundles that could not be properly recorded with the then-current digital sensors, especially when using 24 x 36 mm sized sensors.



The last version of the Epson R-D1 s

The introduction and positive reception of the digital Epson R-D1 (released in late 2004) convinced the Leica engineers that a digital M was feasible when using a smaller-sized sensor that could sidestep the edge ray problem. The choice was a Kodak sensor, slightly larger than the one used in the DMR. Some problems had to be tackled: a special surface with angled micro-lenses was necessary to guide the light rays to the correct pixel location and a special absorption filter on the cover glass to reduce the infrared part of the spectrum reaching the sensor surface (the sensor is inherently sensitive for IR

radiation).

The previous studies that mixed M and R components (the mythical M6E) had indicated that a vertically running shutter could be incorporated within the classical body size and the R8 shutter was readily available. Inserting a digital sensor module and associated circuit boards into the existing M-body was impossible and a new body design with separate front and back units was required. The loss of structural integrity was offset with a rigid rangefinder and top cover assembly.



A design study for the M8 camera by Prof. Achim Heine

The M8 was introduced in 2006 (after some two years of development time) and had the look and feel of the 'standard' Leica M7 and MP cameras. Now Leica photographers had a clear choice. The smaller sensor area with a crop factor of 1.33 limited the effective angle of view of all Leica M lenses but was most prominent with the wide angle lenses. After 50 man-years of R&D the leader of the development team, Jürgen Hess could notice: mission accomplished: the M8 is the digital M3! Indeed, Peter Karbe, intensely involved in the project could claim that the electronic components were designed to match the optical system, not the other way around. The software for the post-processing was created by Jenoptik.

The 'digital M' was eagerly awaited and the pressure from the market to introduce such a camera was immense. The sales of the traditional CRF cameras slumped while Leica put its hope on the illustrious history. This combination of facts forced the company to unveil the M8. The M8 offered all specifications of the M7 (TTL, semi-automatic exposure) and added very fast shutter speeds, motorized transport and of course digital technology with a 10.3 megapixel sensor, DNG file format and a range of ISO speeds from 160 to 2500. Most Leicas were sold

to art photographers, rich hobbyists and collectors and the M8, to stay attractive for this group, had to add quality and cachet and play down the digital technology.



The M8 had two shortcomings that could be solved. The first issue is the increased sensitivity for the infrared part of the spectrum, caused by the very thin absorption filter (the DMR had an interference filter), that records some dark and black synthetic parts with a reddish cast. This is a system-related effect and can be solved by the use of special infrared filters before the lens and Leica provided every early buyer of the M8 with two such filters. The second problem is the occurrence of so-called banding or smear-effect, visible as light streaks extending from light sources against a dark background. This is a high-contrast phenomenon that occurs at higher ISO ratings while in this situation the strengthening of the signal is more pronounced and the camera-electronics have trouble with the signal-processing. This problem can only be solved by exchanging part of the electronics (done by Leica under guarantee).



Leica M8 with Noctilux 1:0.95/50 mm ASPH.

The M8.2 was introduced two years later and offered a shutter with a lower top speed but with reduced noise level and more pleasant noise profile,

a Snapshot mode and a sapphire cover glass. The improved shutter and the sapphire glass could be fitted also on the M8 under the so-called Upgrade Program, originally announced as a method of upgrading existing digital cameras with future innovations as a kind of investment protection. The program was quietly killed.



The M8 has a special edition, the white one (white Nappa cowhide leather, white paint) is a particularly pleasing version: the set includes a white body (serial number start around 3510165 with special marking xxx/275) and a silver anodized (a first for Leica) 2.8/28mm ASPH lens. The M8.2 has been offered in a limited-edition Safari Green model (500 pieces).

The M8/M8.2 are very fine cameras, but the initial bad press and the newer M9 with the larger 24x36-sized sensor have made it less popular than the camera deserves.

Model; Leica M8
Code; 10702 (silver chrome); 10701 (black paint)
Period; 2006 - 2008; serial number start: 3100000
Type; 18x27; DNG 3916x2634, 10.5 megapixel (effective 10.3 megapixel)
Finder; bright-line range- and viewfinder with auto-matic parallax correction
Rangefinder baselength; 69.25
Finder magnification; 0.68
Frame lines; 24-35; 28-90; 50-75
Finder indications; Rangefinder spot, framelines, exposure diodes, flash indication, in AUTO: shutter speeds in half steps, long exposure counter
Rangefinder; manual, mechanical, contrast and split

image measuring method

Exposure meter; center-weighted method by light reflected from a white blade in the middle of the metal-blade slotted shutter

Exposure handling; manual selection of speed and aperture with over- and under exposure indication in finder: in AUTO stepless shutter speeds with aperture priority, shutter speeds, long exposure indication, flash indication

Monitor: 2.5 inch, 230000 pixels

Meter sensitivity in LV; 0 - 20

Sensor speeds (ISO); sensor: 160 to 2500

Shutter speeds; Manual : 4 sec to 1/8000 in half steps; AUTO 32 sec to 1/8000 step-less (indication in nearest half step)

Shutter control and type; electronic; vertical metal Flash ; SCA or manual guide number, M-TTL pre-flash only with selected flash units

Flash synchronization; 1/250

Film transport; automatic, electric motor

Measurements; 138.6 x 80.2 x 36.9

Bottom plate dimension; 35.8

Weight body (gr); 545



Differences:

Model; Leica M8.2

Code; 10711 (black paint) , 10712 (silver chrome)

Period; 2008 - 2009

Shutter speeds; Manual : 4 sec to 1/4000 in half steps; AUTO 32 sec to 1/4000 step-less (indication in nearest half step)

Shutter control and type; electronic; vertical metal

Flash synchronization; 1/180

Film transport; automatic, electric motor, silent mode

Extra; Snapshot mode (S on the shutter dial), sapphire cover glass over monitor

24. The most beautiful modern Leica cameras

The selection is based on a personal bias!

Below: Leica MP



Below: Leica M9-P



Below: Leica M8.2



Below: Leica Monochrom



25. Leica M Special editions

The Leica M body has a very modular design: transport lever, rewind mechanism, top cover, bottom cover, rangefinder magnification and selection of frame lines, body covering can be changed and mixed at will. It is not surprising that the regular camera bodies have been offered with a bewildering range of options, the black chrome and silver chrome versions included. Black paint and titanium chrome versions are also common, where the titanium is not pointing to the material, but to a titanium layer that is attached to the standard metal parts. The flexible exchange of parts (which includes inscriptions of text and logos on the top cover) is the base for the current à-la-carte program, a special service of Leica for customers who want to personalize and individualize their film-loading M-camera.

Leitz has always been keen on using special events and special serial numbers to commemorate significant anniversaries and jubilees with out-of-the-box cameras in limited batches. If Leitz and later Leica had restricted themselves to these occasions, one might be able to make a comprehensive listing of these limited editions. In any event this is a delightful opportunity for collectors to complete their collection. The trend however to manufacture special editions for every customer who is willing to pay the additional money, makes the whole scene rather confusing. Every few months a new edition pops up around the globe. There is a mixed feeling about this strategy of limited editions. On the one hand this approach has produced some of the most beautiful M-bodies, but on the other hand the shift to a valuable luxury item distracts from the origin of the camera as a supreme instrument for involved photography.

Below a short list of special editions can be found, but this one is certainly not complete!

| Year | Model | From # | Total | Comments |
|------|------------|---------|-------|--------------------|
| 1975 | M4 Jubilee | | 1750 | |
| 1975 | M5 Jubilee | | 1750 | |
| 1979 | M4-2 Gold | | 1000 | Oskar Barnack |
| 1983 | M4-P | | 2500 | 1913-1983 |
| 1984 | M6 | 1657251 | | start of M6 models |
| 1986 | M6 QE | | 1 | special model |

| | | | | |
|------|-------------|----------|------|----------------------------------|
| 1987 | M6 | | 100 | Leica Photographic Centre Zurich |
| 1988 | M6 | | 43 | LHSA 20 years |
| 1988 | M6 | 1712001 | 3 | TWF-ETH |
| 1989 | M6 Platina | 1757001 | 1250 | 150 Jahre Photographie |
| 1989 | M6 | 1774001 | 125 | Schmidt-Japan |
| 1989 | M6 Panda | | | chrome with black dials |
| 1990 | M6 | | 100 | LHSA 20 years |
| 1990 | M6 | | 125 | Hegner Japan |
| 1991 | M6 | 1907101 | 200 | Colombus |
| 1992 | M6 | 1928200 | 101 | Year of the Roster |
| 1992 | M6 | 1929001 | 199 | Year of the Roster |
| 1993 | M6 | 1937001 | 101 | Royal-Foto Austria |
| 1993 | M6 | 1938000 | 150 | LHSA 25 years |
| 1994 | M6J | | 1640 | 40 Jahre M |
| 1994 | M6 | | 100 | Foto Ganz, Zurich |
| 1994 | M6 | | 1 | European Publishers Award 1994 |
| 1994 | M6 | | 500 | Traveller Set |
| 1994 | M6 Gold | 2000000 | 1 | Gold Thailand |
| 1994 | M6 Gold | 2001000 | 334 | Gold Brunei |
| 1994 | M6 | 2002000 | 101 | Royal Photographic Society |
| 1995 | M6 | | 300 | Dragon |
| 1995 | M6 | | 150 | Leica Historica Blue leather |
| 1995 | M6 | | 200 | Danish Wedding |
| 1995 | M6 | | 150 | Historica 1975-1995 |
| 1995 | M6 | 2006218? | 90 | Demo Polyphoto Italy |
| 1995 | M6 | 2174367? | 90 | Demo Benelux |
| 1995 | M6 Gold | 2176001 | 700 | Gold Thailand |
| 1995 | M6 Platina | 2177001 | 250 | Platina Brunei |
| 1996 | M6 Platina | 2283001 | 125 | Platina Diamond Brunei |
| 1996 | M6 Gold | 2283201 | 125 | Gold Diamond Brunei |
| 1996 | M6 Gold | 2283601 | 25 | Gold Diamond Brunei |
| 1996 | M6 Platina | 2278301 | 150 | Schmidt Group centenary |
| 1997 | M6 | 2300000 | 1 | Ein Stuck Leica |
| 1997 | M6 | 2300001 | 995 | Ein Stuck Leica |
| 1996 | M6 Platina | 2278001 | 200 | Anton Bruckner |
| 1996 | M6 | | 500 | Partneraktion Deutschland 1996 |
| 1996 | M6 | | 40 | Switzerland: test of the best |
| 1998 | M6 | | 50 | Jaguar XK 150 |
| 1998 | M6 BI Paint | | 17 | Gruppo Fotografica Leica |
| 1999 | M6 Platina | 2490000 | 150 | Leica 150 Jahre Optik |
| 1998 | M6 | | 1 | M6 Henri Cartier-Bresson |
| 2000 | M6TTL | 2480340? | 1150 | Black Paint LHSA |

| | | | | |
|------|----------------|----------|------|---------------------------------|
| 1999 | M6TTL BI Paint | 2500000 | 1 | Vaclec Havel |
| 1999 | M6TTL BI Paint | 2500001 | 2000 | Millenium |
| 2000 | M6TTL BI Paint | 2554501 | 150 | Black Paint |
| 2000 | M6TTL | | 150 | KANTO, Japan |
| 2000 | M6TTL | | 150 | Oresundbron |
| 2000 | M6TTL | | 200 | ICS (Iimport Camera Society) |
| 2000 | M6TTL 0.85 | 2688001 | 500 | Dragon 2000 |
| 2000 | M6TTL | | 850 | LHSA black paint, 0.72 and 0.85 |
| 2000 | M6TTL | 2554501 | 150 | Oresund Bridge |
| 2000 | M6TTL | | 2000 | Sibon Hegner Japan |
| 2001 | M6TTL | | 300 | Hongkong Green paint |
| 2001 | M6TTL | 2555500 | 1 | William Klein |
| 2001 | M6TTL | 2680501 | 400 | NSH |
| 2001 | M6TTL Titanium | | 1000 | LHSA |
| 2001 | M6TTL | | 2 | Marten Luther King |
| 2001 | M6TTL | 2753001 | 100 | Hansa |
| 2001 | M6TTL | | 16 | Sheik Saud |
| 2000 | M6TTL | | | Green M6/Safari M6 |
| 2000 | M6TTL | | 40 | Test the best |
| 2002 | M6TTL | 2755001 | 999 | Leica M6 1984-2002, die Letzten |
| 2003 | M6TTL | | 150 | flags per country (12) |
| 2003 | M7 Titanium | | 1 | Sheikh Al-Thani |
| 2003 | MP | 2921345? | 500 | Hermes |
| 2003 | M7 | | 50 | 50 Anniversary Midland Leitz |
| 2004 | MP | 2947201 | 600 | 35 year LHSA Grey Hammertone |
| 2004 | MP | 2984001 | 400 | 35 year LHSA Grey Hammertone |
| 2003 | M7 Titanium | 3000001 | 1000 | 50 Years M |
| 2003 | MP | 3001001 | 595 | 35 year LHSA Grey Hammertone |
| 2004 | MP | | 100 | betriebsk. |
| 2004 | M7 | | 100 | betriebsk. |
| 2004 | MP | | 50 | 50 Anniversary Leica M3 set |
| 2004 | MP SGR | 3010101 | 500 | |
| 2005 | M6TTL | | 1 | Nomi Baumgartl, Charity 2005 |
| 2005 | MP 3 | 3026101 | 1000 | |
| 2005 | MP Korea | 3027100 | 100 | |
| 2006 | M3 J | 3087301 | | |
| 2006 | M7 CPA Edition | 3121956 | 51 | |
| 2006 | MP | 3122101 | 196 | MP titanisiert for Japan |
| 2008 | M8 | | | Safari version |

| | | | | |
|------|--|--|------|--|
| 2008 | M8 | | | White version |
| 2009 | M7 | | 200 | Hermes version with 1.4/35mm asph. |
| 2010 | M8.2 | | 100 | 60th anniversary Peoples Republic of China |
| 2010 | MP gold with Slux | | | 60th anniversary Peoples Republic of China |
| 2010 | M9 red | | | 100 years Foto Rahn, price = € 12605 |
| 2010 | M9 Ostrich Leather | | | Mitsukoshi, price = \$10256 |
| 2010 | M9 black | | | Leica Store Tokyo |
| 2010 | M9 Titanium | | 500 | LED illumination of frame lines |
| 2010 | M9 ostrich leather | | 50 | NeimanMarcus edition with Summicron 2/35 |
| 2011 | M9-P and M3-P + chrome Noctilux-M | | 2;20 | 20 Jahre Leica Shop Wien |
| 2011 | M7 green | | 101 | Xinhai Revolution China |
| 2011 | M9-P Hamertone | | 100 | Leica Ginza Store, plus Elmarit-M 2.8/28 ASPH |
| 2012 | M9-P | | | blue-grey with silver 2/35 |
| 2012 | MP | | 100 | Taiwan centenary establishment |
| 2012 | M9-P White with silver anodized Noctilux | | 50 | Leica Daimaru Tokyo |
| 2012 | Hermes M9-P | | 300 | with silver anodized Summilux-M 1.4/50 mm ASPH; € 20000 |
| 2012 | Hermes M9-P set Jean-Louis Dumas | | 100 | with three lenses: Summicron 28 mm, Noctilux 50 mm, Apo-Summicron 90 mm; € 40000 |

were expensive to make, because the layer of paint is thicker than the chrome plating and the parts had to be made with slightly different dimensions so that the final outer size stays the same. The motor drive is quite big and adds substantial volume to the camera body. It is evident that Leitz does not yet master the intricacies of miniaturization.



The SL2 has been described as the apogee of the mechanical semi-automatic Leitz designed and manufactured SLR cameras, but it was clear around 1974 that Leitz was at a crossroads and had to decide what direction to take: a more compact system for the advanced amateur market or a more versatile and sophisticated system.

The average sales of about 13000/year were obviously below a break-even point and one should also take into account the developments inside the company. Between 1973 and 1975 the Leitz family transferred the management (and ownership) of the company to Wild Heerbrugg, an enterprise that did not show much interest in the photographic division of the Leitz Werke. The cooperation with Minolta was already effective in 1971 with the preparations for the CL and one may assume that the development of the Leica R3, introduced in 1976 was started around 1974 or even earlier. The new Copal/Leitz-shutter (CLS) vertically running shutter and the complex mirror movement were Leitz designs that did not fit the SL series and were presum-

ably prepared for a totally new design. The company however did not want or could not find the financial resources to invest into a new Wetzlar concept. The collaboration with Minolta promised to become the better commercial solution or the last chance to stay in the photographic business. The manufacture of rangefinder cameras was already stopped and the successor of the Leicaflex would be produced in Portugal.



The size of the Leicaflex with attached motor-drive can be derived from this promotional picture. The ergonomics is quite well conceived, but for casual picture-taking the camera body is too big. Leica made the same mistake with the Leica R8, also a very well engineered and designed camera.

There exists an interview with one of the original 'Konstrukteure' of the Leicaflex, who explained that the designers had a much more advanced camera in mind, but the conservative management did not accept the proposals. This claim cannot be verified, but if true the story of the Leica Reflex could have been much different.

27. LEICA R3

On the second-hand market the Leica R3 is treated like a poor relation. This particular Leica camera is not held in high esteem, because it is not seen as a true Leica camera and had not the proverbial Leitz reliability. Indeed the first batches, made in Portugal (the earliest batch of 2000 units is made in Wetzlar!) had some problems with the electrical circuitry that consisted mainly of complex clusters of soldered wires and electrical-mechanical interfaces. Leitz had to gain experience with the integration of pcb's (printed circuit boards). The camera became a very reliable instrument after the start-up problems had been eliminated: a change from wiring harness to flexible circuits. The main problem with the camera is of an emotional nature: the camera looks like an adapted Minolta XE-7 (in Europe XE-1), has impressive size and is not the best in ergonomic design.



The overall shape shows the profile of the previous Leicaflex, but it lacks the workmanlike look: the devil is in the details and here the Leitz designers may not have their day. The camera was in the catalogues for three years (1976 – 1979) and sold in rather large quantities (for a Leica camera!): some 65000 – 70000 were allocated and presumably manufactured. The camera was the first electronic reflex camera, made by Leitz and clearly targeted at the advanced amateur market, given the price range. The size of the camera is then a bit puzzling: the trend in the market was in the direction of more compact cameras with a width of at most 144 mm and the CLS shutter was explicitly designed as a more compact unit than the Japanese vertically running bladed shutters of that period. The camera

offered spot- and weighted average metering with aperture priority mode and electronically controlled shutter speeds from 4 sec to 1/1000. This level of automation required a third cam on the lens bayonet to inform the camera of the maximum aperture of the lens. From 1978 on Leitz produced lenses with only one cam, specifically for the R3 and subsequent models, that integrated the functions of the previous mount with three cams.

The camera has been finished in black and silver-chrome, and a special edition with green paint (NATO approved!) has been made: the Safari model (5000 units in 1977 – 1978). Another special edition is the 24 carat gold-plated one (1979-1980: 1000 units: serial numbers 1523851 – 1524850) with lizard and crocodile skin finish to celebrate the centenary of the birth of Oskar Barnack.

The R3 is the first Leitz reflex camera system where the Leitz engineers had to rely on outside sources for major components. The R3 shows that they had trouble to find an elegant solution for the integration of all parts. Leitz claimed that 75% of all parts were of Wetzlar origin, but that is a bit misleading when you count every single component: the major parts from outside sources are the body chassis, the shutter mechanism and the prism. Leitz parts are the finder screen, the mirror mechanism and the exposure metering system.



Model; Leica R3/R3 MOT
Period; 1976 - 1979: 1446001 – 1525350 (MOT 1978 – 1979: 1492251 – 1523750)
Type; film-cartridge loading 24x36
Finder; built-in pentaprism,
Finder indications; ground-glass screen, micro-prism focusing spot, shutter speed, matching meter needles,

R6: 1988 – 1992: 1728451 – 1783000; 19000
 R-E: 1990 – 1994: 1777501 – 1908500: 8000
 R6.2: 1992 – 2001: 1900001- 2782020: 18000
 R7: 1992 – 1998: 1908501 – 2282400: 30000

62.2 weight body (grams); 670



Differences:
 Model: R4s: exposure modes limited to manual and aperture-priority
 Model: R4s-2 (USA R4s-P): same as R4s, but with manual override.
 Model: R5: includes TTL flash, shutter speeds 15 sec - 1/2000 (auto); 1/2 – 1/2000 (manual); increased sensitivity to EV 1 –20 (0.25 – 125000 cd/m²)
 Model: R-E: simplified version of R5: no program mode, no shutter speed priority
 Model: R6: mechanical shutter 1 –1/1000, B; increased sensitivity to EV –1 –20 (0.063 – 125000 cd/m²); exposure mode: manual only
 Model R6.2: shutter speed increased to 1/2000
 Model: R7: increased sensitivity to EV 0 –20 (0.125 – 125000 cd/m²); measurements in mm; 138.5 x 94.8 x

On the next page there are drawings of the Leica R6, the most famous of the classical R-cameras and the last of the breed, the R8. The differences in style and design are quite visible and show the evolution of the species.



Above: the mechanical R6, below: the electronic R8



Type; film-cartridge loading 24x36
 Autofocus: active infrared beams
 Finder; Kepler-type telescope, adapts automatically to 40mm and 80mm focal length
 Lens: two built-in with motorized change between 40 mm 1:2.8 (4 lenses - 4 groups) and 80 mm 1:5.6 (2x converter: 3 lenses - 2 groups)
 Exposure modes: program, automatic flash
 Exposure meter; centre-weighted integral
 Meter sensitivity; EV 6 – 17
 Shutter speeds; 1/8 - 1/400
 Shutter control and type; electronically controlled
 Flash ; built-in
 Film transport; automatic motor-winder
 Measurements in mm; 140 x 76 x 60
 Weight body (grams); 385 with battery



Model; C2 - Zoom second version with Data back
 Code: 18002; 18003 (databack)
 Period; 1991 – 1993: serial numbers: not recorded
 Type; film-cartridge loading 24x36
 Autofocus: active infrared beams
 Finder; Kepler telescope-type, adapts automatically to zoom range
 Lens: zoomlens 3.5 – 7.7/40 – 90 mm (4 elements - 4 groups, three aspherical surfaces!)
 Exposure modes: program, automatic flash
 Exposure meter; centre-weighted integral
 Meter sensitivity ; EV 6 – 17
 Shutter speeds; 1/4 - 1/350
 Flash ; built-in
 Film transport; automatic motor-winder
 Measurements in mm; 148 x 77 x 61
 Weight body (grams); 330 without battery

Leica Mini

This is the first compact camera with an original Leica lens design, and a Panasonic manufactured body with Leica design elements. The whole range

of cameras is closely related technically. The final one with a new body design is the Z2X, framed by Leica as the most ergonomic compact camera with Leica optical performance. The camera was been a fine seller, based on comprehensive specs and good looks.



Model; Mini
 Code: 18011; 18012 (databack)
 Period; 1991 – 1993: serial numbers: 1800001 – 1850000; total allocated 50000
 Type; film-cartridge loading 24x36
 Autofocus: active infrared beams
 Finder; telescope-type
 Lens; Leica Elmar 3.5/35mm (4 elements - 3 groups)
 Exposure modes: program, automatic flash
 Exposure meter; centre-weighted integral
 Meter sensitivity ; EV 6 – 16
 Shutter speeds; 1/5 - 1/250, B
 Flash ; built-in
 Film transport; automatic motor-winder
 Measurements in mm; 118 x 65 x 38.5
 Weight body (grams); 160 without battery



Differences Mini II, also with data back
 Code: 18013; 18014 (databack)
 Period; 1993 – 1996: 1850001 – 1900000: total allocated 50000
 Exposure compensation + 2 EV and pre-flash for red eye prevention



Differences Mini Zoom:
 Code: 18004; 18005 (data back)
 Period: 1993 – 1997: serial numbers: 1941001 – 2235000; total allocated 150000;
 Different body shape, more rounded
 Finder; adapts automatically to zoom range
 Lens: Leica Vario-Elmar 4-7.6/35 – 70 mm (seven elements and six groups)
 Meter sensitivity ; EV 6–17
 Shutter speeds; 1/4 - 1/300, B
 Measurements in mm; 123 x 71.5 x 43
 Weight body (grams); 230 without battery



Differences Mini 3:
 Code: 18016; 18017 (databack); 18018 (titanium plated); 18019 (titanium plated, databack)
 Serial numbers: 1996 – 1997: 2241001 – 2321000; 44000; with Databack: 2265001 – 2331000; 22000
 Body shape more rounded, two color design, partly titanium covered.
 Finder; Albada-type with illuminated frame
 Lens: Leica Summar 3.2/32mm (4 elements, three groups)
 Meter sensitivity ; EV 6–17
 Shutter speeds; 1/6 - 1/250, B (T-99)
 Measurements in mm; 119 x 64 x 35 (40 with data back)
 Weight body (grams); 165 (180 with DB), without battery



Differences Leica Z2X
 Code: 18032 (silver); 18033 (silver, databack); 18034 (black); 18035 (black, databack)
 Period: 1997 – 2001: serial numbers: 2332001 – 2849750; total allocated 157294;
 Different body shape, more rounded
 Finder; adapts automatically to zoom range
 Lens: Leica Vario-Elmar 4-7.6/35 – 70 mm (seven elements and six groups)
 Meter sensitivity ; EV 6–17
 Shutter speeds; 1/4 - 1/300, B T-99
 Measurements in mm; 124 x 69.6 x 42.6 (DB 43.6)
 Weight body (grams); 245 (248 with DB) without battery

Leica Minilux, Minilux Zoom

One of the classic compact cameras from Leica for the serious photographer who does not want to compromise on image quality. and has a Panasonic manufactured body with Leica design elements. The camera was very well manufactured, had metal guide rails, titanium layer for the body parts, but some problems jump up now and then, especially with the retractible lens unit. A special edition of the Minilux with snakeskin cover was announced in 2002.



Sensor: CCD 1/1.76 inch 4 million pixels (effectively 3.9 Megapixel)
 Resolution: 2240 x 1680, 24 bit color depth
 File format: TIFF, JPEG
 Finder; optical real-image with automatic zooming
 Lens: Leica DC Vario-Summicon 2 – 2.5/7 – 21 mm ASPH. (33 – 100mm in 35mm format)
 Autofocus; yes, also manual focus
 Exposure meter; auto, Program, Aperture priority, Time priority, manual
 Exposure measurement; multi-field, integral, selective
 Sensor speed (ISO); Auto, 100 – 200 – 400
 White compensation: auto, manual 5 settings
 LCD monitor; 2.5 inch TFT-LC 205000 pixels
 Shutter speeds; 8- 1/1000
 Video function; yes
 Flash; built-in, hot-shoe for external flash
 Measurements in mm; 127 x 83.3 x 67.4
 Weight (grams); 385/460 (without/with battery)



Model; DIGILUX 2
 Code: 18264
 Period; 2003 - 2006 (serial numbers: 2984401 – 3026100; total allocated: 31000)
 Type; digital
 Sensor: CCD 2/3 inch 5.24 million pixels (effectively 5 Megapixel)
 Resolution: 2560 x 1920, 24 bit color depth
 File format: RAW, JPEG, motion-JPEG
 Finder; electronic finder with automatic zooming, 235000 pixels
 Lens: Leica DC Vario-Summicon 2 – 2.4/7 – 22.5 mm ASPH. (28 – 90mm in 35mm format); 13 elements - 10 groups
 Autofocus; yes, also manual focus
 Exposure meter; auto, Program, Aperture priority, Time priority, manual
 Exposure measurement; multi-field, integral, selective
 Sensor speed (ISO); 100 – 200 – 400

White compensation: auto, manual, 5 settings
 LCD monitor; 2.5 inch TFT-LC 205000 pixels
 Shutter speeds; 8- 1/4000
 Video function; yes
 Flash; built-in, hot-shoe for external flash
 Measurements in mm; 135 x 82 x 103
 Weight (grams); 630/705 (without/with battery)



Model; DIGILUX 3
 Code: 18282
 Period; 2006 - 2008 (serial numbers: 3181001 – 3268000; total allocated: 16300)
 Type; digital, four-thirds camera with 4/3 bayonet, interchangeable lenses
 Sensor: CMOS 17.3 x 13.0 mm; 7.9 million pixels (effective 7.5million pixels)
 Resolution: 3136 x 2352, 24 bit color depth
 File format: TIFF, JPEG
 Finder; electronic viewfinder with automatic zooming
 Lens: Leica D Vario-Elmarit 2.8 – 3.5/14 – 50 mm ASPH. with optical image stabilization (28 – 100 mm in 35mm equivalent); 16 elements and 12 groups, two aspherical surfaces.
 Autofocus; yes, also manual focus
 Exposure meter; auto, Program, Aperture priority, Time priority, manual
 Exposure measurement; 49-field in finder, 256-field in Live View
 Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600
 White compensation: auto, manual, 5 settings
 LCD monitor; 2.5 inch TFT-LCD 207000 pixels
 Shutter speeds; 60- 1/4000 (8 minutes in B)
 Video function; yes
 Flash; built-in, hot-shoe for external flash
 Measurements in mm; 145.8 x 86.9 x 80
 Weight (grams); 530 (body)



Model; D-Lux
 Code: 18237
 Period; 2003 - 2005 (serial numbers: 2891101 – 2921100; total allocated: 30000)
 Type; digital
 Sensor: CCD 1/2.5 inch; 3.2 million pixels
 Resolution: 2048 x 1536, 24 bit color depth
 File format: JPEG
 Finder; optical finder with automatic zooming
 Lens: Leica DC Vario-Elmarit 2.8 – 4.9/5.8 – 17.4 mm ASPH. (35– 105 mm in 35mm equivalent); 7 elements in 6 groups, 3 aspherical surfaces.
 Autofocus; yes, also manual focus
 Exposure meter; auto, Program, Aperture priority, Time priority, manual
 Exposure measurement; centre weighted, matrix, selective
 Sensor speed (ISO); 50 – 100 – 200 – 400
 White compensation: auto, manual, 5 settings
 LCD monitor; 1.5 inch TFT-LCD 114000 pixels
 Shutter speeds; 8 – 1/2000
 Video function; yes
 Flash; built-in,
 Measurements in mm; 121 x 52 x 34
 Weight (grams); 204 (with battery)

Model; D-Lux 2
 Code: 18270 (silver)
 Period; 2005 - 2006 (serial numbers: 3027201 – 3057200; total allocated 30000)
 Type; digital
 Sensor: CCD 1/1.65 inch; 8.6 million pixels (effective 8.4 Mp)
 Resolution: 3840 x 2160, 24 bit color depth
 File format: RAW, TIFF, JPEG
 Finder; none
 Lens: Leica DC Vario-Elmarit 2.8 – 4.9/6.3 – 25.2 mm ASPH. (28– 112 mm in 35mm equivalent); optical

image stabilization
 Autofocus; yes, also manual focus
 Exposure meter; auto, Program, Aperture priority, Time priority, manual
 Exposure measurement; centre weighted, matrix, selective
 Sensor speed (ISO); Auto, 80 – 100 – 200 – 400
 White compensation: auto, manual
 LCD monitor; 2.5 inch TFT 207000 pixels
 Shutter speeds; 60– 1/2000
 Video function; yes
 Flash; built-in,
 Measurements in mm; 105.7 x 58.3 x 25.6
 Weight (grams); 185/220 (without/with battery)

Below: D-lux 2



Model; D-Lux 3



Code: 18300 (black); 18307 (silver)
 Period; 2006 - 2008 (serial numbers: 3147001 – 3516500; total allocated 155400)
 Type; digital

Exposure measurement; multi-field, center-weighted average, spot
Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600 – 3200

White compensation: auto, four choices, manual selection

LCD monitor; 3 inch TFT 461000 pixels

Shutter speeds; 60 – 1/2000 (starry sky 15 s, 30 s, 60 s)

Video function; HD

Flash; built-in,

Measurements in mm; 124 x 81 x 95

Weight (grams); 540 (with battery)

Extras: scenes mode, effects



Model; V-Lux 30

Code: 18162 (black anodized)

Introduced; 2011 - current

Type; digital

Sensor: CMOS 1/2.33 inch; 15.1 million pixels (effective 14.1 Mp)

Resolution: 4320 x 3240 (4:3), 24 bit color depth

File format; JPEG

Finder; electronic 202000 pixels

Lens: Leica DC Vario- Elmar 3.3 – 5.9/4.3 – 68.8 mm ASPH. (24– 384 mm in 35mm equivalent), 12 elements, 10 groups, 6 aspherical surfaces on three elements, optical image stabilizer

Autofocus; face recognition, AF tracking, multi-field, 1-field, spot, touch field

Exposure meter; Program, A, T, manual

Exposure measurement; multi-field, center-weighted average, spot

Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600

White compensation: auto, four choices, manual selection

LCD monitor; 3 inch TFT 460800 pixels

Shutter speeds; 60 – 1/4000 (starry sky 15 s, 30 s, 60 s)

Video function; HD

Flash; built-in,

Measurements in mm; 104.9 x 57.6 x 33.4

Weight (grams); 219 (with battery)

Extras: scenes mode, effects, GPS



Model; V-Lux 40

Code: 18175 (black anodized)

Introduced; 2012 - current

Type; digital

Sensor: CMOS 1/2.33 inch; 15.3 million pixels (effective 14.1 Mp)

Resolution: 4320 x 3240 (4:3), 24 bit color depth

File format; JPEG

Finder; electronic 460800 pixels, screen sensitive

Lens: Leica DC Vario- Elmar 3.3 – 6.4/4.3 – 86mm

ASPH. (24– 480 mm in 35mm equivalent), 12 elements, 10 groups, 6 aspherical surfaces on three elements, optical image stabilizer

Autofocus; face recognition, AF tracking, multi-field, 1-field, spot, touch field

Exposure meter; Program, A, T, manual

Exposure measurement; multi-field, center-weighted average, spot

Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600 – 3200

White compensation: auto, four choices, manual selection

LCD monitor; 3 inch TFT 460800 pixels

Shutter speeds; 15 – 1/2000

Video function; HD

Flash; built-in,

Measurements in mm; 105 x 59 x 28

Weight (grams); 210 (with battery)

Extras: scenes mode, effects, GPS, 3D photo-function

31. LEICA X1 and X2

The X1 is a remarkable mix of efficient German engineering demanded by purists and an abundance of features required by Japanese consumerism.

The design of the camera evokes a visual reminiscence to the original Leica-0 camera. The vital statistics are 124 x 60 x 32mm which is quite close to the measured values of 123.59 x 60.3 x 33mm. The precise numbers depend on the exact position where you measure. The weight is 330 grams. The original Leica thread-mount cameras varied from length 128mm (Ur-Leica) to 136mm (Leica IIIc) and height from 53mm (Ur-Leica) to 69mm and width from 30mm to 30.5mm for the whole range. The width of the X1 of 33mm includes the thickness of the display screen; the basic body size is exactly 29.92mm. The Leica-0 had a length of 133.2mm. The close conformity of these dimensions with the dimensions of the Ur-Leica might give rise to the assumption that the X1 has true Leica DNA. The camera is a cooperation between Leica and a small Japanese company.

The X1 is a very compact camera and the layout of controls supports easy handling, even one finger operation if necessary. The length of 124mm is a bit short for comfortable handling and here one has to admire the basic instinct of Barnack that a half centimeter more does make a big difference. The X1 offers an accessory hand grip to add that centimeter.

It might be suitable for the classical style of street and documentary photography. The image quality is excellent and certainly no hindrance for this photographic style. It is no match for the instant response of the M-series (film loading and sensor based) and a certain expertise in anticipation is most welcome to get exactly the shot one wants. The imaging engine of the X1 (lens, sensor, processing) delivers impressive results: the performance is without doubt Leica-like. The endeavor to give the camera a shot of Leica DNA however is less convincing. The decision to overload the camera with consumerism-items distracts from the basic simplicity and efficiency that all true Leica cameras do possess. Later batches of the camera had tighter quality control and a high level of 'Manufaktur'-feeling and finish.

The selection of a compact body and a large sensor has set a trend in mirror-less system cameras that

can deliver excellent performance in a small pocketable package, just like the original Leica.



Model; X1

Code: 18 420 (steel grey); 18400 (black anodized)

Period; 2009 - 2012

Type; digital

Sensor: APS-C CMOS; 12.9 million pixels (effective 12.2 Mp)

Resolution: 4272 x 2856

File format; DNG, JPEG

Finder; none

Lens: Leica Elmarit 2.8/24 mm ASPH. (36 mm in 35mm equivalent), 8 elements, 6 groups, 1 aspherical element

Autofocus; face recognition, 11-field, 11-field high speed, 1-field, 1-field high speed, spot

Exposure meter; Program, A, T, manual

Exposure measurement; intelligent multi-field, center-weighted average, spot

Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600 – 3200

White compensation: auto, five choices, manual selection, fine tuning over two color axis

LCD monitor; 2.7 inch TFT 230000 pixels

Shutter speeds; 30 – 1/2000

Video function; none

Flash; built-in

Measurements in mm; 124 x 59.5 x 32

Weight (grams); 286/330 (without/with battery)

Extras: additional finder, hand grip



Differences

Model; X2

Code: 18450 (Black anodized); 18452 (silver anodized)

Period; 2012 - current

Sensor: APS-C CMOS; 16.5 million pixels (16.2 effective Mp)

Resolution: 4944 x 3272

File format; DNG, JPEG Super fine JPEG

Sensor speed (ISO); Auto, 100 – 200 – 400 – 800 – 1600 – 3200-6400-12500

Measurements in mm; 124 x 69 x 51.5

Weight (grams); 316/345 (without/with battery)

Extras: attachable electronic Visoflex finder



32. Leica Digital Professional Cameras

32.1. LEICA S1

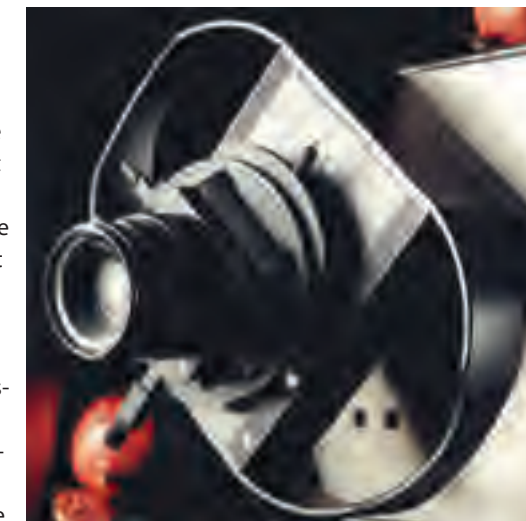
The Leica S1 as a prototype was announced at Photokina 1996, and improved upon significantly before the market launch in 1997.

Basically the S1 is a high-resolution scanner with a 3 channel, RGB trilinear CCD architecture (3 x 5200 pixels) made by Kodak. This type of scanner is typically used in variety of applications that include graphic art flatbed scanners; high-speed document scanners and copiers and studio photography camera backs. At first sight the S1 did not fit into the Leica world of 35mm photography and the product had a very low profile on the Leica stand. Leica cameras were however used in studios, graphical workshops, reproduction shops and museums where the slides, made with Leica cameras and lenses were scanned with drum scanners and prepared in a pre-press process for final output. The functional added-value of the Leica camera is limited to the quality of the slide and the quality of the lens. There is some logic in simplifying the process by skipping the slide as recording medium: it will speed up the process and with the excellent scanning software of Silverfast there is no quality loss in the final stage. The implicit strategy of Leica might be that the S1, using preferably the R-lenses, could boost the sales of these lenses and stem the advances of digital backs attached to medium format cameras. The S1 could be used with a multitude of lens adapters, including a tilt-and-shift adapters.

The careful profiling of the S1 in the prepress and high-end scanning workflow did not jeopardize the role and significance of the M- and R-systems of 35mm photography, but added an area of expertise to the Leica portfolio that did not exist before. The strategy to move into areas where the competition is not a critical factor has also been adopted for the introduction of the S2.

The S1 was quickly updated in 2008 with three new models that covered a wider spectrum of applications to become more competitive in the emerging market of digital reflex cameras from Kodak, Canon and Nikon and the manufacturers of digital backs. The performance of the S1 is beyond any doubt, but the selling price was very high, the support by Leica limited, some teething problems dented the repu-

tation of the company/product and Leica itself did obviously not believe in the product. Only 146 units have reportedly been sold. The parameters of the S1 (pixel pitch 7 micron, 5200 x 5200 pixels) have now been equalled by the S2.



Above: Leica S1 with Zeiss lens

Model: S1

Period; 1996 - 1998 (serial numbers: 2286001 – 2287500; total allocated: 1500)

Type; digital

Sensor: 3 channel, RGB trilinear CCD architecture (3 x 5200)

Sensor size: 36 x 36 mm

Resolution: 5200 x 5200, 36 bit color depth

File format: Photoshop formats

Finder: optical reflex finder

Lens: all Leica R and M lenses, many adapters for most other lens systems

Film speed (ISO); 50

Dynamic range: 1000 : 1; Dmax 3.3, 11 stops

Differences:

S1 Alpha

Resolution: 2570 x 2570, 42/48 bit

Sensor speed (ISO): 400 – 1200 (with binning to 9600)

Dynamic range: 2000 : 1

S1 Pro

Resolution: 5140 x 5140, 42/48 bit

Sensor speed (ISO): 200 – 600 (with binning to 4800)

Dynamic range: 2000 : 1

33. LEICA lenses : State of the art designs

Leica has upgraded all equipment for manufacturing their lenses since the last decade. Almost all machines are computer controlled and are able to produce components with tolerances as small as two micrometers. The previous generation operated with tolerances of five to fifteen sometimes twenty micrometers. Not every part of a lens needs to be manufactured with such narrow tolerances. The new generation of Summilux and Noctilux designs (SX 21 and 24, NX 0.95) require this level of precision to be able to perform as well in practice as on paper. Leica M-lenses and S-lenses are both high-tech designs, but in different domains. The M-lenses are purely mechanical constructions that are optimized for the physical small size and the high speed of the lens. The S-lenses are mechatronic constructions with integral autofocus mechanisms that require a much bigger size. The development of R-lenses had stopped before the production of the R-cameras was phased out in 2008/2009.

The Summilux-M 50mm 1:1.4 ASPH and its sibling, the Apo-Summicron-M 75mm 1:2 ASPH do represent the current state of the art in optical design. Recent additions to this family are the Noctilux 50mm 1:0.95 and the Summilux-M 21mm 1:1.4 ASPH and 24mm 1:1.4 ASPH. The most recent addition is the Apo-Summicron-M 1:2/50 mm ASPH, presenting a very high level of performance for such a high-speed-medium angle lens for classic miniature photography (film-based and solid state). The combination of aspherical surfaces, floating elements and in particular the break through in lens surface treatment with the new glass types may be the turning point in the history of optical design for film-based and solid-state photography. Looking at the MTF graphs one may see still room for improvement, compared the best designs in the R-range (the long focal lenses) and the new S-range, but for the M-line one is inclined to see the current level as a platform.

To extract more performance out of the design would imply more complicated designs at a cost that no one will feel prepared to pay. On the other hand the technique required to use this high performance is so demanding that it makes the concept of a dynamic style of M photography obsolete.

Mechanically the new lenses are at the edge of manufacture and quality assurance. These designs could never be made in large quantities and one may be very happy that Leica is not sitting on its laurels and wishes to exploit its niche properties to deliver outstanding quality for the discerning Leica user and aficionado.

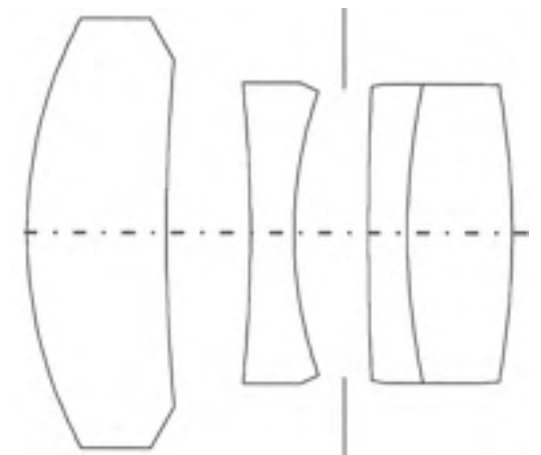
Leica lenses for Leica cameras have been produced since 1925 and in 2010 the 4.000.000 mark has been reached. The durability and longevity of these lenses is so high that many of them are still available on the second hand market. Most of the lens types (aperture/focal length versions) can be bought new too. The Leica M-user has a bewildering choice or "embarrass de riche" from close to one hundred original Leica types and versions. (The R-user can choose between more than 65 lenses and the S-user has now four lenses and several new ones that are announced). In addition there are many third-party lenses with L39- and M-mount of which the Zeiss lenses are optically excellent with good mechanical mounts and the Voigtländer lenses that are of varying quality, mechanically and optically. The Leica aficionado will identify and discuss with great enthusiasm the differences in character that every lens design has been presumed to possess. In a sense that is true. Every lens has its specific aberration correction, as this is derived from the overall characteristics, aperture, focal length and physical dimensions). In the individual reports a description and explanation of the character of the lens, mostly based on the measurable properties will be presented. It is possible, when closely looking at the performance profile or fingerprint, to identify groups of lenses, which share many characteristics. It is well known that any Leica lens, when stopped down to 1:5.6 or 1:8 will deliver image quality that is commendably good and differs mainly in the depth of field domain.

Critical analysis of much-enlarged digitally captured and processed images will reveal important differences in colour correction. When the picture has been made under heavy-duty circumstances (strong highlights or backlighting, high contrast and oblique light rays striking the lens) big differences

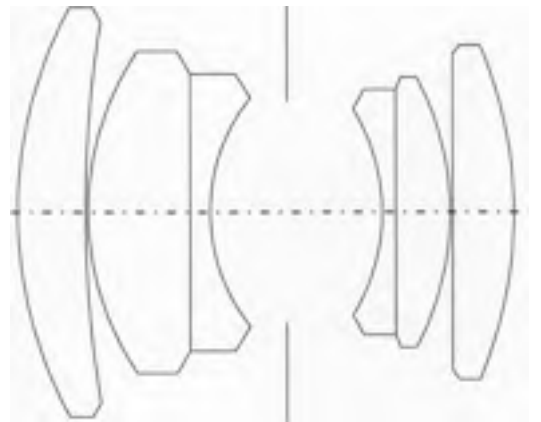
can be detected without much effort on film and digitally acquired files. For many a Leica user, there is a fun factor involved when using older lenses. And it gives indeed much satisfaction, to use an older Elmar or Summar for photographing those typical Parisian scenes and getting fine images that are a pleasure to look at. Lens performance and manufacture has improved over the years and an older Summar is not as 'good' (optically and mechanically) as the current Summicron. When using a vintage lens on a digital M-camera, the post-processing options (especially enhanced edge contrast) will improve the image visually (but not technically). If one looks critically at comparison pictures, the difference is still evident; software does however level out some of the greater differences. How one will appreciate or value this difference is an entirely personal matter. The new book about image evaluation (part three of this series) will give insights into this topic. Sometimes, Leica photographers claim that the improvements are not visible in practical picture taking and can only be detected in artificial situations, like photographing the proverbial flat paper page or test chart on the wall. Such an approach lacks substance and denies the real optical progress that has been made over the years. It is a fact of life that the capabilities of the photographer are becoming the limiting factor in exploiting the quality of Leica lenses.

The optical evolution of the high-speed standard lens can be shown in a number of diagrams from the Elmar to the current Apo-Summicron-M.

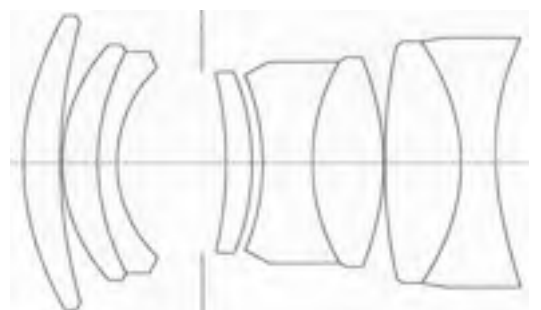
One has to be careful when comparing lens diagrams. Sometimes obvious differences have hardly any impact on the performance and sometimes factors that influence the quality are not visible. The choice of the glass type is such a factor: not visible, but very important. Standard lenses for miniature cameras (the designation for cameras with a capture size of 24 x 36 mm, but in the digital world these cameras are often referred to as FF-cameras (full frame) are the four-element Tessar type and the six-element Planar (or Double-Gauss type). These lens types have served the photographic world for over a hundred years. Modern insights produced radically different designs.



Above: a classical Elmar design (2.8/50mm)



Above: the current Summicron lens is from 1979



Above: the newest Summicron 50 mm member

The Apo-Summicron-M 2/50 mm ASPH indicates the progress that has been achieved: look in particular at the behind-the-aperture group: here the creativity of the optical designer (Peter Karbe) is clearly visible.

34. Leica Rangefinder lenses

34.1. Hologon 15mm 1:8



Period (in catalogue): 1972 - 1976
Code: 11003 (black)
Serial #: 5.474.xxx - (Zeiss numbers)
Total produced: 350/500
Maximum Aperture: 1:8
Focal length (nominal): 15mm
Elements/Groups: 3/3
Angle: 110°
Minimum distance: 20 cm
Weight: 110 grams
Filter: special graded filter
Black version only
No lens hood

In 1972 the Hologon 1:8/15mm from Zeiss had been added to the M-lens line. It offered virtually distortion-less imagery and a fairly even illumination. A graduated filter can be used when the residual vignetting is really disturbing which is often the case. The lens is primarily a collectors item and a fine example of Zeiss optical know-how of that period: the performance is commendably good. The lens was added to the Leica range of M-lenses to

increase the popularity of the then-new M5 camera. If the production total is a guide the lens has been made presumably in only one or maybe two badges and stayed in the catalogues as long as stock lasted. Such extreme wide-angle lenses do not harmonize with the rangefinder technique where selective focus is one of the main elements.

34.2. Tri-Elmar-M 16-18-21mm 1:4 ASPH.



Period (in catalogue): 2006 - current
Code: 11642 (black)
Serial #: 3.995.091 - current
Maximum Aperture: 1:4
Focal length (nominal): 16 - 18 - 21mm
Elements/Groups: 10/6, two elements with one aspherical surface each
Angle: 107, 100, 92°
Minimum distance: 50 cm
Weight: 335 grams
Separate filter holder: E67, Adapter 14473
Black anodized version only.
6-bit lens identification
Screw-on type lens hood

This Tri-Elmar-M is the second construction that uses a zoom-lens design with three mechanical slots for fixed focal lengths, the first one being the Tri-Elmar-M 28-35-50 ASPH. It is extremely compact and operates with silk-smooth precision. Optically it is quite impressive, especially when one considers the small size. The lens has a linear movement which simplifies the design somewhat, but the addition of internal focusing adds mechanical complexity to the already complex optical design. The compactness of the lens has been made possi-

ble by a novel method of attaching a separate filter holder and the lens hood. It is a patented thread that stops the hood and filter holder at a specified position; independent of the point where you begin the movement. It has the same secure lock and precise position as a bayonet. The lens is remarkably flare resistant, even shooting straight against the sun does not generate any ghosting effects. This lens is suited for the inspired snapshot-shooter who wants fresh and novel impressions when taking emotionally inspired pictures. The lens was introduced during the production of the M8 to provide users of this camera with the classical viewing angles of 21-24-28 mm focal length.

34.3. Super-Elmar-M 18mm 1:3.8 ASPH.



Period (in catalogue): 2008 - current
Code: 11649
Maximum Aperture: 1:3.8
Focal length (nominal): 18mm
Elements/Groups: 8/7, one element with two aspherical surfaces
Angle: 100°
Minimum distance: 70 cm
Weight: 310 grams
Filter: E77 (Adapter 14484)
Black anodized version only.
6-bit lens identification
Lens hood: separate, screw-on type with stop

The lens is produced in the current standard livery for Leica M lenses: a clean and stylish design that offers a very smooth movement and solid handling.

The lettering no longer follows the sharp-featured digital style but the rounded forms of the classical Leitz era.

The design of the mount is based on the current engineering approach in which components are manufactured with the required tolerances of the machined parts before assembly takes place. This technique limits the amount of manual adjustments and selection of suitable parts during assembly and ensures a consistent high level of quality. Optical performance is excellent at all apertures. This lens is a true workhorse lens and it is also one of the very few lenses without flaws and can be classified as a masterpiece of design.

34.4. Super-Angulon 21mm 1:4



Period (in catalogue): 1958 - 1963
Code: SUOON (11002K) L39 mount, SUMOM (11102L) bayonet
Serial #: 1.583.001 - 1.717.000
Maximum Aperture: 1:4
Focal length (nominal): 21mm
Elements/Groups: 9/4
Angle: 92°
Minimum distance: 40 cm
Weight: 250 grams
Filter: E39
One chrome version in screw mount and bayonet, with serial numbers in the Leitz range and also some in the Schneider range (6.318.xxx).
Separate lens hood

The use of a symmetrical design was imperative for

very wide-angle lenses because such a wide angle of view introduces several aberrations that can cancel each out with a symmetrical design: the aberrations, introduced in the front section of the lens will be fully corrected by the same aberrations present in the rear section. The designer then was free to pay attention to other problematic errors. Leitz adopted this Schneider version and used the same name: Super-Angulon.

Artistically it is a challenging lens and only a few photographers can really produce arresting pictures with such a lens. Jean-Loup Sieff and Bill Brandt come to mind, both of which did not use the 21mm for landscapes or interiors, but for nude studies. In his autobiography, the famous German photo-reporter Robert Lebeck noted that the look through the finder for the Leica 21mm lens, convinced him to start using the Leica rangefinder.

Performance is pretty good at wider apertures and excellent after stopping down to 1:8 and smaller. The lens is delightfully compact and for that reason still popular, but deeply recessed into the camera body. In its days it was quite a popular lens and sold more than 8000 units.

34.5. Super-Angulon 21mm 1:3.4



Period (in catalogue): 1963 - 1980
Code: 11103 bayonet
Serial #: 1.967.101 - 2.917.150
Maximum Aperture: 1:3.4
Focal length (nominal): 21mm
Elements/Groups: 8/4
Angle: 92°

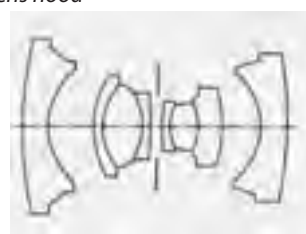
Minimum distance: 40 cm, rangefinder coupled to 100 cm or 70 cm.

Weight: 300 grams

Filter: E48 or Series VII

One chrome version at first. Serial numbers in Leitz range and (rare) also in Schneider range (13.218.xxx). Later (ca. 1968) black version only. Still later (ca. 1971) version that could be used on M5.

Separate lens hood



The same optical cell has been used for the M and R versions. It is a complex design with 8 elements, each of which is made from a different glass type. Performance is very commendable at wider apertures and excellent when stopped down to 1:8 and smaller.

Many lenses from this period share the characteristic that the textural details are recorded with a certain softness that at bigger enlargements gives the impression that the plane of focus has narrowly been missed. It is true that the extended gradient between sharpness and unsharpness gives a pleasing effect to the pictures at the detriment of a clearly defined plane of critical sharpness. This is part of the fingerprint that defines the general characteristic of all Angulon lenses. The lens sold in modest quantities given the long period in the catalogue: about 12000.

34.6. Super-Elmar-M 21mm 1:3.4 ASPH.

Period (in catalogue): 2011- current

Code: 11 145

Maximum Aperture: 1:3.4

Focal length (nominal): 21mm

Elements/Groups: 8/7, one element with two aspherical surfaces

Angle: 92°

Minimum distance: 70 cm

Weight: 260 grams

Filter: E46 (female thread)

Male thread with stop for separate lens hood.

6-bit lens identification



This 21mm lens has the classical specifications of Super-Angulon fame and might strike a nostalgic chord with seasoned Leica users. This new lens is compact and of impeccable mechanical quality. Classical lenses could impress with a very solid feel, but sometimes lacked optical substance. The lens is one of the very few wide-angle designs where a discussion of the differences in quality between centre, edge and corner is superfluous. This well-balanced character is one of the hallmarks of current Leica design. The optical prescription guarantees extremely high image quality at all apertures, over the full distance range from 70 cm to infinity and from centre to corner.

Technically the Super-Elmar-M 21mm is a close relative to the Super-Elmar-M 18mm: the behind-the-aperture-group is almost identical and includes the lens element with two aspherical surfaces. The difference of three millimeters in focal length is important for the design parameters: the 21mm version has just a little more optical finesse and almost certainly will become a milestone lens. After the introduction, the lens mount was slightly altered: a bigger diameter of the mount section between the bayonet and the focus ring.

34.7. Elmarit-M 21mm 1:2.8

Period (in catalogue): 1980 - 1997

Code: 11134

Serial #: 2.993.701 - 3.719.102

Maximum Aperture: 1:2.8

Focal length (nominal): 21mm

Elements/Groups: 8/6

Angle: 92°

Minimum distance: 70 cm (first version 30 cm)

Weight: 290 grams

Filter: E49 and later (1985: #3.363.299) E60 for slip-on lens hood

Below: left: first version; right: second version



The first retro-focus design from Leitz in the class of 21mm focal length is of Midland origin and shows a family resemblance with the Elmarit-R 1:2.8/19mm, which is also a Midland design. The gradual change from symmetrical to retro-focus types for the M-camera was necessary since the introduction of the M5. The second more disguised argument for the change to this different type of designs is the higher potential for optical corrections. This lens is a good performer, but it is not a leading edge construction. The lens is a start of a long line of lenses, but the wide aperture was a bit adventurous which is surprising as the 1980s were a period of rapid progress in optical design. Some 14000 have been manufactured with an average sales volume of 1000/year.



The lens diagram shows some familiarity with the symmetrical Angulon construction, but is the start of a long line of retro-focus lens designs.

34.8. Elmarit-M 21mm 1:2.8 ASPH.

Period (in catalogue): 1997 - 2012

Code: 11135 (black), 11897 (chrome)

Serial #: 3.780.530 - n.a.

Maximum Aperture: 1:2.8

Focal length (nominal): 21mm

Elements/Groups: 9/7, one aspherical surface

Angle: 92°

Minimum distance: 70 cm

Weight: 300 grams (black) and 415 grams (chrome)

Filter: E55

Separate slip-on lens hood

The combination of aspherical surfaces and expanded insight into the principles of the retro-focus design made possible a quantum leap in performance with the introduction of this lens. A careful design will not neglect higher-order aberrations because they will generate noise in the system.



White light consists of all wavelengths, but some wavelengths are more important than others for the ultimate image quality. The Leica designer will try to concentrate the important wavelengths to a spot as small as possible. For less important wavelengths it is sometimes better to spread them out over a larger area and thus diminish the energy level. Then the energy will be below the detection level of the emulsion or sensor and will become harmless. This is the case with this lens. The previous designs tried (not entirely successful) to concentrate all light energy in a small area. Result is a light patch with fuzzy

corners and an uneven distribution of light energy, reducing micro-contrast.

Overall this lens gives outstanding image quality at all apertures. A decade is now the standard lapse of time for a major redesign of a lens: the new Super-Elmar-M 3.4/21mm ASPH. has a maximum aperture that is a mere half stop less, but offers superb performance.

34.9. Summilux-M 21mm 1:1.4 ASPH. FLE

Period (in catalogue): 2008 - current

Code: 11 647

Maximum Aperture: 1:1.4

Focal length (nominal): 21mm

Elements/Groups: 10/8, two elements with one aspherical surface each, floating group

Angle: 92°

Minimum distance: 70 cm

Weight: 580 grams (black)

Filter: Series VIII

6-bit lens identification

Lens hood: Separate, screw-on type



All optical tricks are used to make this lens possible: aspherical surfaces, floating elements, special optical glass and a sophisticated manufacturing process. The mechanical sophistication of the new lenses with floating element technology has been brought to a new plateau: the tiny movements of the floating element must be very precise and consistent over years of use to have effect on the lens performance. The reason why the lens does not have a smallest aperture of 1:22 is related to this level of precision.

The specifications of this Summilux-M are optically very demanding. A massive broad-based cone of

light energy has been guided through the lens to the image plane with a minimum of distortions and aberrations. This design is a clear sign that the Leica optical department has now the confidence to tackle almost any design challenge, however optically daring. The maximum aperture of 1:1.4 not only allows extreme wide-angle pictures in situations with low illumination, but also tackles the classical problem of wide-angle designs: the large depth of field, that makes selective focus difficult to achieve. Taking pictures in close range at maximum aperture solves the problem with the subject beautifully contrasted against the background.

The Summilux-M 21mm delivers outstanding image quality, even at its widest aperture and when one takes into account the high-speed of the lens, it is close to superb. This lens can hardly be faulted and should become one of the top lenses in the Leica M range. The only critical comment would be the size and weight, but this is a physical necessity.

34.10. Elmar-M 24mm 1:3.8 ASPH.

Period (in catalogue): 2008 - current

Code: 11 604

Maximum Aperture: 1:3.8

Focal length (nominal): 24mm

Elements/Groups: 8/6, one aspherical surface

Angle: 84°

Minimum distance: 70 cm

Weight: 260 grams

Filter: E46

6-bit lens identification

Screw-on type lens hood



The 84 degrees angle of view is very interesting, but also creatively speaking quite demanding. Close-range photography of single persons or small groups conveys an intimacy of close contact. At the same time one can make a strong statement about the wider surroundings where the individuals are located. Encapsulated intimacy might be the approach. When taking pictures one is naturally inclined to tilt the camera downward a bit in order to include more foreground in the image.

The Elmar-M 24mm, introduced in 2008 is a clever mixture of elements from the classical lens series and modern designs. Leica is a traditional company where time honored principles are not only held in high esteem, but are practiced today. If a company should be equated with design excellence, meticulous craftsmanship and metal-based precision engineering, it is Leica. The design principles, manufacturing requirements and processes were and are focused on manual assembly and very careful attention to very tight tolerances. The new Leica approach to lens design and manufacture tends to emphasize the practice of close-tolerance manufacture and more automated assembly of parts and groups.

The new Elmar-M 3.8/24mm is a lens that has its origins in the current thinking within the Leica company. The lens handles with the traditional Leica smoothness and solidity. The aperture ring has click stops that are very smooth. The number of blades in the Elmar-M 24 is higher than in the Elmarit-M 24 (nine versus eight) and the aperture shape is more circular: better for unsharpness rendition.

The Elmar 24mm performs superbly well at all apertures. The size is extremely comfortable for snapshot use. The demanding and discerning user gets all the performance that can be required for exhibition type pictures of a very high calibre. The Elmar-M 1:3.8/24mm ASPH represents outstanding value for money and shows a very high level of performance. There is hardly a discipline where the Elmar-M 24 does not bring outstandingly good results. This lens is a general purpose lens that might follow in the footsteps of the classical Elmar 3.5/50mm lens that in its day captured a large proportion of the iconic Leica images.

| From # | To # | Name | Year |
|--------|--------|------------|---------|
| 100 | 122 | 0-series | 1923 |
| 123 | 130 | Prototyp | 1924 |
| 131 | 1000 | I | 1925 |
| 1001 | 2445 | I | 1926 |
| 2446 | 5433 | I | 1926-27 |
| 5434 | 5700 | I | 1928 |
| 5701 | 6300 | Compur | 1926-29 |
| 6301 | 13100 | I | 1928 |
| 13101 | 13300 | Compur | 1929 |
| 13301 | 21478 | I | 1929 |
| 21479 | 21810 | Compur | 1930 |
| 21811 | 34550 | I | 1930 |
| 34451 | 34802 | Compur | 1930 |
| 34803 | 34817 | Luxus | 1930 |
| 34818 | 60000 | I | 1930 |
| 60001 | 71199 | I | 1931 |
| 71200 | 101000 | II | 1932 |
| 101001 | 106000 | std | 1932 |
| 106001 | 107600 | II | 1933 |
| 107601 | 107757 | III | 1934 |
| 107758 | 108650 | II | 1934 |
| 108651 | 108700 | III | 1933 |
| 108701 | 109000 | II | 1933 |
| 109001 | 111550 | III | 1933 |
| 111551 | 111580 | II chr | 1933 |
| 111581 | 112000 | III | 1933 |
| 112001 | 112500 | II chr | 1933 |
| 112501 | 114400 | III | 1934 |
| 114001 | 114050 | std chr | 1933 |
| 114051 | 114052 | Rep. (prt) | 1933 |
| 114053 | 114400 | III | 1934 |
| 114401 | 115300 | II chr | 1933 |
| 115301 | 115650 | III | 1934 |
| 115651 | 115900 | II chr | 1934 |
| 115901 | 116000 | std chr | 1934 |
| 116001 | 123000 | III chr | 1933 |
| 123001 | 123580 | std | 1934 |
| 123581 | 124800 | III chr | 1933 |
| 124801 | 126200 | III chr | 1933 |
| 126201 | 126800 | III | 1933 |
| 126801 | 137400 | III | 1934 |
| 137401 | 137625 | std | 1934 |
| 137626 | 138700 | III chr | 1934 |
| 138701 | 138950 | std chr | 1934 |
| 138951 | 139900 | II chr | 1934 |
| 139901 | 139950 | std | 1934 |
| 139951 | 140000 | II | 1934 |
| 140001 | 141500 | III chr | 1934 |

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|--------|--------|-------------|---------|
| 141501 | 141850 | std | 1934 |
| 141851 | 141900 | II | 1934 |
| 141901 | 142250 | III chr | 1934 |
| 142251 | 142350 | II | 1934 |
| 142351 | 142500 | III | 1934 |
| 142501 | 142700 | I std | 1934 |
| 142701 | 143425 | III | 1934 |
| 143426 | 143750 | II chr | 1934 |
| 143751 | 143900 | I | 1934 |
| 143901 | 144200 | III | 1934 |
| 144201 | 144400 | II | 1934 |
| 144401 | 144500 | I | 1934 |
| 144501 | 145600 | III | 1934 |
| 145601 | 145800 | I | 1934 |
| 145801 | 146200 | III | 1934 |
| 146201 | 146375 | II | 1934 |
| 146376 | 146675 | III | 1934 |
| 146676 | 146775 | II | 1934 |
| 146776 | 147000 | III | 1934 |
| 147001 | 147075 | Std | 1934 |
| 147076 | 147175 | II | 1934 |
| 147176 | 147875 | I chr | 1934 |
| 147876 | 148025 | II chr | 1934 |
| 148026 | 148850 | III chr | 1934 |
| 148851 | 148950 | II chr | 1934 |
| 148951 | 149350 | III chr | 1935 |
| 149351 | 149450 | I | 1934-35 |
| 149451 | 149550 | II chr | 1934-35 |
| 149551 | 150000 | III chr | 1935 |
| 150001 | 150124 | Rep. FF | 1934-36 |
| 150125 | 150200 | Rep. GG | 1935-36 |
| 150201 | 150850 | III chr | 1934-35 |
| 150851 | 151100 | I | 1935 |
| 151101 | 151225 | III | 1935 |
| 151226 | 151300 | II | 1935 |
| 151301 | 152500 | III | 1935 |
| 152501 | 152600 | I chr | 1935 |
| 152601 | 153175 | III chr | 1935 |
| 153176 | 153225 | II | 1935 |
| 153226 | 153550 | III | 1935 |
| 153551 | 153700 | II | 1935 |
| 153701 | 154150 | III | 1935 |
| 154151 | 154200 | II | 1935 |
| 154201 | 154800 | III | 1935 |
| 154801 | 154900 | I chr | 1935 |
| 154901 | 156200 | III | 1935 |
| 156201 | 156850 | IIIa 1/1000 | 1935 |
| 156851 | 157250 | III | 1935 |
| 157251 | 157400 | II | 1935 |

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|--------|--------|---------|------|
| 157401 | 158300 | IIIa | 1935 |
| 158301 | 158350 | I | 1935 |
| 158351 | 158400 | II | 1935 |
| 158401 | 158650 | IIIa | 1935 |
| 158651 | 159000 | III | 1935 |
| 159001 | 159200 | IIIa | 1935 |
| 159201 | 159350 | I | 1935 |
| 159351 | 159550 | III | 1935 |
| 159551 | 159625 | IIIa | 1935 |
| 159626 | 159675 | III | 1935 |
| 159676 | 160325 | IIIa | 1935 |
| 160326 | 160375 | III | 1935 |
| 160376 | 160450 | I | 1935 |
| 160451 | 160700 | II | 1935 |
| 160701 | 161150 | I | 1935 |
| 161151 | 161450 | II | 1935 |
| 161451 | 161550 | IIa | 1935 |
| 161551 | 161600 | III | 1935 |
| 161601 | 161800 | IIIa | 1935 |
| 161801 | 161950 | III chr | 1935 |
| 161951 | 162100 | IIIa | 1935 |
| 162101 | 162175 | III | 1935 |
| 162176 | 162350 | IIIa | 1935 |
| 162351 | 162400 | III | 1935 |
| 162401 | 162500 | IIIa | 1935 |
| 162501 | 162625 | III | 1935 |
| 162626 | 162675 | IIIa | 1935 |
| 162676 | 162750 | III | 1935 |
| 162751 | 162800 | IIIa | 1935 |
| 162801 | 162825 | III | 1935 |
| 162826 | 162925 | IIIa | 1935 |
| 162926 | 162975 | III | 1935 |
| 162976 | 163050 | IIIa | 1935 |
| 163051 | 163100 | III | 1935 |
| 163101 | 163225 | IIIa | 1935 |
| 163226 | 163250 | III | 1935 |
| 163251 | 163400 | IIIa | 1935 |
| 163401 | 163450 | I | 1935 |
| 163451 | 163550 | IIIa | 1935 |
| 163551 | 163775 | III | 1935 |
| 163776 | 163950 | IIIa | 1935 |
| 163951 | 164150 | I | 1935 |
| 164151 | 164275 | IIIa | 1935 |
| 164276 | 164675 | III | 1935 |
| 164676 | 164900 | IIIa | 1935 |
| 164901 | 165000 | II | 1935 |
| 165001 | 165100 | III | 1935 |
| 165101 | 165300 | II | 1935 |
| 165301 | 165500 | I | 1935 |

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|--------|--------|------|------|
| 165501 | 165975 | III | 1935 |
| 165976 | 166075 | IIIa | 1935 |
| 166076 | 166600 | III | 1935 |
| 166601 | 166750 | IIIa | 1935 |
| 166751 | 166900 | III | 1935 |
| 166901 | 167050 | IIIa | 1935 |
| 167051 | 167175 | III | 1935 |
| 167176 | 167200 | IIIa | 1935 |
| 167201 | 167225 | III | 1935 |
| 167226 | 167700 | IIIa | 1935 |
| 167701 | 167705 | III | 1935 |
| 167751 | 168000 | I | 1935 |
| 168001 | 168200 | II | 1935 |
| 168201 | 168250 | III | 1935 |
| 168251 | 168325 | IIIa | 1935 |
| 168326 | 168400 | III | 1935 |
| 168401 | 168500 | IIIa | 1935 |
| 168501 | 168600 | III | 1935 |
| 168601 | 168725 | IIIa | 1935 |
| 168726 | 168750 | III | 1935 |
| 168751 | 168850 | IIIa | 1935 |
| 168851 | 169000 | I | 1935 |
| 169001 | 169200 | III | 1935 |
| 169201 | 169350 | I | 1935 |
| 169351 | 169450 | II | 1935 |
| 169451 | 169550 | III | 1935 |
| 169551 | 169650 | II | 1935 |
| 169651 | 170150 | IIIa | 1935 |
| 170151 | 170500 | III | 1935 |
| 170501 | 171300 | IIIa | 1935 |
| 171301 | 171550 | II | 1935 |
| 171551 | 171900 | I | 1935 |
| 171901 | 172250 | IIIa | 1935 |
| 172251 | 172300 | III | 1935 |
| 172301 | 172350 | IIIa | 1935 |
| 172351 | 172600 | III | 1935 |
| 172601 | 172800 | II | 1935 |
| 172801 | 173000 | I | 1935 |
| 173001 | 173125 | IIIa | 1935 |
| 173126 | 173176 | III | 1935 |
| 173177 | 173425 | IIIa | 1935 |
| 173426 | 173475 | III | 1935 |
| 173476 | 173500 | IIIa | 1935 |
| 173501 | 173650 | I | 1935 |
| 173651 | 173675 | IIIa | 1935 |
| 173676 | 173725 | III | 1935 |
| 173726 | 173825 | IIIa | 1935 |
| 173826 | 173900 | III | 1935 |
| 173901 | 174025 | IIIa | 1935 |

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|--------|--------|------|------|
| 174026 | 174075 | III | 1935 |
| 174076 | 174100 | IIIa | 1935 |
| 174101 | 174125 | III | 1935 |
| 174126 | 174150 | IIIa | 1935 |
| 174151 | 174400 | III | 1935 |
| 174401 | 174650 | II | 1935 |
| 174651 | 174675 | IIIa | 1935 |
| 174676 | 174750 | III | 1935 |
| 174751 | 174950 | IIIa | 1935 |
| 174951 | 175125 | III | 1935 |
| 175126 | 175200 | IIIa | 1935 |
| 175201 | 175350 | III | 1935 |
| 175351 | 175450 | IIIa | 1935 |
| 175451 | 175500 | III | 1935 |
| 175501 | 175700 | I | 1935 |
| 175701 | 175750 | III | 1935 |
| 175751 | 175850 | IIIa | 1935 |
| 175851 | 175900 | III | 1935 |
| 175901 | 176100 | IIIa | 1935 |
| 176101 | 176150 | III | 1935 |
| 176151 | 176250 | IIIa | 1935 |
| 176251 | 176300 | III | 1935 |
| 176301 | 176600 | IIIa | 1935 |
| 176601 | 177000 | III | 1935 |
| 177001 | 177400 | IIIa | 1935 |
| 177401 | 177550 | III | 1935 |
| 177551 | 177600 | IIIa | 1935 |
| 177601 | 177700 | III | 1935 |
| 177701 | 177800 | I | 1935 |
| 177801 | 177900 | IIIa | 1935 |
| 177901 | 178000 | III | 1935 |
| 178001 | 178100 | IIIa | 1935 |
| 178101 | 178250 | III | 1935 |
| 178251 | 178550 | IIIa | 1935 |
| 178551 | 178600 | III | 1935 |
| 178601 | 179200 | IIIa | 1935 |
| 179201 | 179250 | III | 1935 |
| 179251 | 179500 | IIIa | 1935 |
| 179501 | 179575 | II | 1935 |
| 179576 | 179800 | I | 1935 |
| 179801 | 179900 | II | 1935 |
| 179901 | 180100 | IIIa | 1935 |
| 180101 | 180400 | III | 1935 |
| 180401 | 180475 | IIIa | 1935 |
| 180476 | 180700 | III | 1935 |
| 180701 | 180800 | I | 1935 |
| 180801 | 181000 | II | 1935 |
| 181001 | 181450 | IIIa | 1935 |
| 181451 | 181550 | III | 1935 |

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|--------|--------|------|---------|
| 181551 | 181600 | IIIa | 1935 |
| 181601 | 181700 | III | 1935 |
| 181701 | 182000 | IIIa | 1935 |
| 182001 | 182050 | III | 1935 |
| 182051 | 182300 | IIIa | 1935 |
| 182301 | 182350 | III | 1935 |
| 182351 | 182500 | IIIa | 1935 |
| 182501 | 182700 | I | 1935 |
| 182701 | 182850 | II | 1935 |
| 182851 | 183500 | IIIa | 1935 |
| 183501 | 183600 | II | 1935 |
| 183601 | 183750 | I | 1935-36 |
| 183751 | 184400 | IIIa | 1936 |
| 184401 | 184450 | III | 1936 |
| 184451 | 184700 | IIIa | 1936 |
| 184701 | 184750 | III | 1936 |
| 184751 | 184800 | IIIa | 1936 |
| 184801 | 184950 | III | 1936 |
| 184951 | 185200 | IIIa | 1936 |
| 185201 | 185350 | III | 1936 |
| 185351 | 185500 | II | 1936 |
| 185501 | 185650 | I | 1936 |
| 185651 | 185700 | III | 1936 |
| 185701 | 185800 | I | 1936 |
| 185801 | 186100 | IIIa | 1936 |
| 186101 | 186200 | III | 1936 |
| 186201 | 186500 | IIIa | 1936 |
| 186501 | 186550 | III | 1936 |
| 186551 | 186800 | IIIa | 1936 |
| 186801 | 186900 | III | 1936 |
| 186901 | 186950 | IIIa | 1936 |
| 186951 | 187000 | III | 1936 |
| 187001 | 187100 | IIIa | 1936 |
| 187101 | 187200 | III | 1936 |
| 187201 | 187400 | IIIa | 1936 |
| 187401 | 187500 | III | 1936 |
| 187501 | 187650 | II | 1936 |
| 187651 | 187775 | III | 1936 |
| 187776 | 187785 | IIIa | 1936 |
| 187786 | 187850 | III | 1936 |
| 187851 | 188100 | IIIa | 1936 |
| 188101 | 188300 | III | 1936 |
| 188301 | 188600 | I | 1936 |
| 188601 | 188750 | II | 1936 |
| 188751 | 189300 | IIIa | 1936 |
| 189301 | 189475 | III | 1936 |
| 189476 | 189800 | IIIa | 1936 |
| 189801 | 189900 | III | 1936 |
| 189901 | 190200 | IIIa | 1936 |

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|---------|---------|------|-------------------------|---------|----------|
| 3737201 | 3737700 | 1996 | Elmarit-M | 2.8 | 24 |
| 3737701 | 3738700 | 1996 | Noctilux-M | 1.0 | 50 |
| 3738701 | 3739700 | 1996 | Elmar-M | 2.8 | 50 |
| 3739701 | 3740700 | 1996 | Apo-Macro-Elmarit-R | 2.8 | 100 |
| 3740701 | 3740711 | 1996 | Apo-Telyt-R | 2.8 | 280 |
| 3740712 | 3741211 | 1996 | Apo-Summicron-R | 2.0 | 180 |
| 3741212 | 3741212 | 1996 | Summicron-M | 2.0 | 50 |
| 3741213 | 3741299 | 1996 | Frei | | |
| 3741300 | 3741588 | 1996 | Elmar-M | 2.8 | 50 |
| 3741589 | 3742588 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3742589 | 3743088 | 1996 | Apo-Extender-R 2,0 | | |
| 3743089 | 3744088 | 1996 | Elmarit-M | 2.8 | 28 |
| 3744089 | 3744588 | 1996 | Macro-Elmarit-R | 2.8 | 60 |
| 3744589 | 3746588 | 1996 | Vario-Elmar-R | 4.0 | 80-200 |
| 3746589 | 3747588 | 1996 | Summicron-M | 2.0 | 50 |
| 3747589 | 3747618 | 1996 | Vario-Elmar-R | 4.0 | 35-70 |
| 3747619 | 3748118 | 1996 | Apo-Telyt-R | 4.0 | 280 |
| 3748119 | 3749118 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3749119 | 3749718 | 1996 | Vario-Elmar-R | 4.0 | 80-200 |
| 3749719 | 3749999 | 1996 | Frei | | |
| 3750000 | 3750125 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3750126 | 3750999 | 1996 | Frei | | |
| 3751000 | 3751125 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3751126 | 3751999 | 1996 | frei | | |
| 3752000 | 3752125 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3752126 | 3752999 | 1996 | Frei | | |
| 3753000 | 3753125 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3753126 | 3754125 | 1996 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3754126 | 3754625 | 1996 | Elmarit-R | 2.8 | 24 |
| 3754626 | 3754825 | 1996 | Module 4/400/560 | | |
| 3754826 | 3755025 | 1996 | Module 5,6/560/800 | | |
| 3755026 | 3755525 | 1996 | Elmarit-M | 2.8 | 24 |
| 3755526 | 3755535 | 1996 | Vario-Elmar-R | 3.5-4,5 | 28-70 |
| 3755536 | 3756035 | 1996 | Vario-Apo-Elmarit-R | 2.8 | 70-180 |
| 3756036 | 3757035 | 1996 | Summicron-M | 2.0 | 50 |
| 3757036 | 3757235 | 1996 | Apo-Telyt-R 400/560/800 | | |
| 3757236 | 3757999 | 1996 | Frei | | |
| 3758000 | 3758999 | 1996 | Summilux-M ASPH | 1.4 | 35 |
| 3759000 | 3759499 | 1996 | Vario-Elmar-R | 4,2 | 105-280 |
| 3759500 | 3759999 | 1996 | Elmarit-M | 2.8 | 90 |
| 3760000 | 3760999 | 1996 | Summilux-M | 1.4 | 50 |
| 3761000 | 3761999 | 1996 | Elmar-M | 2.8 | 50 |
| 3762000 | 3762999 | 1996 | Apo-Macro-Elmarit-R | 2.8 | 100 |
| 3763000 | 3764799 | 1996 | Vario-Elmar-R | 4.0 | 80-200 |
| 3764800 | 3765799 | 1996 | Summicron-R | 2.0 | 50 |
| 3765800 | 3765899 | 1996 | Apo-Telyt-R 400/560/800 | | |
| 3765900 | 3766099 | 1996 | Apo-Telyt-R 280/400/560 | | |
| 3766100 | 3767099 | 1996 | Summicron-M | 2.0 | 50 |
| 3767100 | 3768099 | 1996 | Summicron-M ASPH | 2.0 | 35 |

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| 3768100 | 3768219 | 1996 | Elmarit-M | 2.8 | 90 |
| 3768220 | 3769219 | 1996 | Elmarit-M | 2.8 | 28 |
| 3769220 | 3769429 | 1996 | PC-Super-Angulon-R | 2.8 | 28 |
| 3769430 | 3769929 | 1996 | Elmarit-M | 2.8 | 90 |
| 3769930 | 3770929 | 1996 | Elmarit-M | 2.8 | 24 |
| 3770930 | 3771929 | 1997 | Summicron-M ASPH | 2.0 | 35 |
| 3771930 | 3772929 | 1997 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3772930 | 3773929 | 1997 | Summilux-M | 1.4 | 50 |
| 3773930 | 3776429 | 1997 | Vario-Elmar-R | 4.0 | 35-70 |
| 3776430 | 3776979 | 1997 | Elmarit-M | 2.8 | 90 |
| 3776980 | 3778779 | 1997 | Vario-Elmar-R | 4.0 | 80-200 |
| 3778780 | 3779779 | 1997 | Elmarit-R | 2.8 | 28 |
| 3779780 | 3780279 | 1997 | Vario-Apo-Elmarit-R | 2.8 | 70-180 |
| 3780280 | 3780529 | 1997 | Elmarit-M | 2.8 | 90 |
| 3780530 | 3781029 | 1997 | Elmarit-M ASPH | 2.8 | 21 |
| 3781030 | 3781329 | 1997 | Module 2,8/280/400 | | |
| 3781330 | 3782329 | 1997 | Elmar-M | 2.8 | 50 |
| 3782330 | 3783329 | 1997 | Elmarit-M | 2.8 | 24 |
| 3783330 | 3783829 | 1997 | Macro-Elmarit-R | 2.8 | 60 |
| 3783830 | 3784329 | 1997 | Elmarit-R | 2.8 | 24 |
| 3784330 | 3785329 | 1997 | Summicron-R | 2.0 | 50 |
| 3785330 | 3785359 | 1997 | PC-Super-Angulon-R | 2.8 | 28 |
| 3785360 | 3786359 | 1997 | Summicron-M ASPH | 2.0 | 35 |
| 3786360 | 3786859 | 1997 | Elmarit-R | 2.8 | 180 |
| 3786860 | 3787359 | 1997 | Elmarit-M ASPH | 2.8 | 21 |
| 3787360 | 3787859 | 1997 | Apo-Extender-R 2x | | |
| 3787860 | 3790259 | 1997 | Vario-Elmar-R | 3,5-4,5 | 28-70 |
| 3790260 | 3790509 | 1997 | Vario-Elmar-R | 3.5 | 35-70 |
| 3790510 | 3791009 | 1997 | Vario-Elmar-R | 4,2 | 105-280 |
| 3791010 | 3792009 | 1997 | Summicron-M | 2.0 | 50 |
| 3792010 | 3793009 | 1997 | Apo-Macro-Elmarit-R | 2.8 | 100 |
| 3793010 | 3794009 | 1997 | Elmarit-M | 2.8 | 28 |
| 3794010 | 3794509 | 1997 | Summilux-R | 1.4 | 50 |
| 3794510 | 3795009 | 1997 | Elmarit-M | 2.8 | 90 |
| 3795010 | 3796009 | 1997 | Summilux-M ASPH | 1.4 | 35 |
| 3796010 | 3796509 | 1997 | Elmarit-R | 2.8 | 19 |
| 3796510 | 3797509 | 1997 | Elmarit-M ASPH | 2.8 | 21 |
| 3797510 | 3797709 | 1997 | Summilux-M | 1.4 | 75 |
| 3797710 | 3797909 | 1997 | Apo-Telyt-R 280/400/560 | | |
| 3797910 | 3798409 | 1997 | Summilux-R | 1.4 | 50 |
| 3798410 | 3798909 | 1997 | Apo-Elmarit-R | 2.8 | 180 |
| 3798910 | 3799409 | 1997 | Summilux-R | 1.4 | 80 |
| 3799410 | 3799909 | 1997 | Apo-Summicron-R | 2.0 | 180 |
| 3799910 | 3800909 | 1997 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3800910 | 3801909 | 1997 | Summicron-M ASPH | 2.0 | 35 |
| 3801910 | 3802409 | 1997 | Apo-Telyt-R | 4.0 | 280 |
| 3802410 | 3803409 | 1997 | Summicron-M | 2.0 | 50 |
| 3803410 | 3803659 | 1997 | Elmarit-M | 2.8 | 90 |
| 3803660 | 3803859 | 1997 | Apo-Telyt-R 280/400/560 | | |

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|---------|---------|------|----------------------|---------|----------|
| 3803860 | 3805859 | 1997 | Vario-Elmar-R | 4.0 | 80-200 |
| 3805860 | 3807859 | 1997 | Elmarit-M | 2.8 | 90 |
| 3807860 | 3808859 | 1997 | Apo-Extender-R 2x | | |
| 3808860 | 3809859 | 1997 | Elmarit-M | 2.8 | 24 |
| 3809860 | 3810859 | 1997 | Summicron-M ASPH | 2.0 | 35 |
| 3810860 | 3811859 | 1997 | Summilux-M ASPH | 1.4 | 35 |
| 3811860 | 3812109 | 1997 | Elmarit-M | 2.8 | 90 |
| 3812110 | 3812124 | 1997 | Vario-Elmarit-R | 2.8 | 35-70 |
| 3812125 | 3813124 | 1997 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3813125 | 3815124 | 1997 | Noctilux-M | 1.0 | 50 |
| 3815125 | 3815624 | 1997 | Apo-Elmarit-R | 2.8 | 180 |
| 3815625 | 3817624 | 1997 | Apo-Summicron-M ASPH | 2.0 | 90 |
| 3817625 | 3818624 | 1997 | Summicron-M | 2.0 | 50 |
| 3818625 | 3819624 | 1998 | Summicron-R | 2.0 | 50 |
| 3819625 | 3820124 | 1998 | Macro-Elmarit-R | 2.8 | 60 |
| 3820125 | 3820624 | 1998 | Summilux-M | 1.4 | 75 |
| 3820625 | 3821624 | 1998 | Summilux-R | 1.4 | 50 |
| 3821625 | 3822624 | 1998 | Summicron-M ASPH | 2.0 | 35 |
| 3822625 | 3823624 | 1998 | Elmarit-M ASPH | 2.8 | 21 |
| 3823625 | 3825124 | 1998 | Elmarit-M | 2.8 | 90 |
| 3825125 | 3825624 | 1998 | Apo-Extender-R 2x | | |
| 3825625 | 3828824 | 1998 | Vario-Elmar-R | 3,5-4,5 | 28-70 |
| 3828825 | 3829824 | 1998 | Summicron-M | 2.0 | 50 |
| 3829825 | 3830324 | 1998 | Elmarit-R | 2.8 | 19 |
| 3830325 | 3831324 | 1998 | Apo-Macro-Elmarit-R | 2.8 | 100 |
| 3831325 | 3834874 | 1998 | Vario-Elmar-R | 4.0 | 35-70 |
| 3834875 | 3836874 | 1998 | Vario-Elmar-R | 4.0 | 80-200 |
| 3836875 | 3837374 | 1998 | Elmarit-R | 2.8 | 24 |
| 3837375 | 3837974 | 1998 | Summilux-M | 1.4 | 75 |
| 3837975 | 3838124 | 1998 | PC-Super-Angulon-R | 2.8 | 28 |
| 3838125 | 3838624 | 1998 | Apo-Telyt-M | 3.4 | 135 |
| 3838625 | 3838667 | 1998 | PC-Super-Angulon-R | 2.8 | 28 |
| 3838668 | 3838999 | 1998 | Summilux-R | 1.4 | 35 |
| 3839000 | 3839999 | 1998 | Vario-Elmarit-R | 2.8 | 35-70 |
| 3840000 | 3840499 | 1998 | Apo-Elmarit-R | 2.8 | 180 |
| 3840500 | 3841499 | 1998 | Summicron-R | 2.0 | 50 |
| 3841500 | 3841999 | 1998 | Vario-Apo-Elmarit-R | 2.8 | 70-180 |
| 3842000 | 3842499 | 1998 | Apo-Telyt-M | 3.4 | 135 |
| 3842500 | 3843499 | 1998 | Summicron-M | 2.0 | 50 |
| 3843500 | 3843999 | 1998 | Summicron-R | 2.0 | 35 |
| 3844000 | 3844999 | 1998 | Elmarit-M | 2.8 | 24 |
| 3845000 | 3845999 | 1998 | Summicron-M ASPH | 2.0 | 35 |
| 3846000 | 3846499 | 1998 | Elmarit-M ASPH | 2.8 | 21 |
| 3846500 | 3847499 | 1998 | Summicron-M ASPH | 2.0 | 35 |
| 3847500 | 3848499 | 1998 | Elmarit-M | 2.8 | 28 |
| 3848500 | 3849499 | 1998 | Elmarit-M ASPH | 2.8 | 21 |
| 3849500 | 3851099 | 1998 | Vario-Elmar-R | 4.0 | 35-70 |
| 3851100 | 3852099 | 1998 | Vario-Elmar-R | 4.0 | 80-200 |
| 3852100 | 3853099 | 1998 | Summicron-M | 2.0 | 50 |

| | | | | | |
|---------|---------|------|----------------------|---------|----------|
| 3853100 | 3853599 | 1998 | Apo-Telyt-M | 3.4 | 135 |
| 3853600 | 3854599 | 1998 | Apo-Macro-Elmarit-R | 2.8 | 100 |
| 3854600 | 3855599 | 1998 | Summicron-M ASPH | 2.0 | 35 |
| 3855600 | 3856299 | 1998 | Elmarit-M | 2.8 | 90 |
| 3856300 | 3856799 | 1998 | Apo-Summicron-M ASPH | 2.0 | 90 |
| 3856800 | 3857349 | 1998 | Elmarit-M | 2.8 | 90 |
| 3857350 | 3857849 | 1998 | Summilux-R | 1.4 | 80 |
| 3857850 | 3858849 | 1999 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3858850 | 3859126 | 1999 | PC-Super-Angulon-R | 2.8 | 28 |
| 3859127 | 3860126 | 1999 | Summilux-M ASPH | 1.4 | 35 |
| 3860127 | 3860376 | 1999 | Elmarit-M | 2.8 | 90 |
| 3860377 | 3861376 | 1999 | Tri-Elmar-M ASPH | 4.0 | 28-35-50 |
| 3861377 | 3862376 | 1999 | Summicron-M ASPH | 2.0 | 35 |
| 3862377 | 3862416 | 1999 | PC-Super-Angulon-R | 2.8 | 28 |
| 3862417 | 3863416 | 1999 | Summicron-M | 2.0 | 50 |
| 3863417 | 3863666 | 1999 | Summilux-R | 1.4 | 35 |
| 3863667 | 3864166 | 1999 | Vario-Elmar-R | 3,5-4,5 | 28-70 |
| 3864167 | 3864666 | 1999 | Summicron-R | 2.0 | 35 |
| 3864667 | 3864966 | 1999 | Elmarit-M | 2.8 | 90 |
| 3864967 | 3865966 | 1999 | Summicron-M ASPH | 2.0 | 35 |
| 3865967 | 3866166 | 1999 | Summilux-M | 1.4 | 75 |
| 3866167 | 3867166 | 1999 | Apo-Summicron-M ASPH | 2.0 | 90 |
| 3867167 | 3867716 | 1999 | Summicron-M | 2.0 | 50 |
| 3867717 | 3868266 | 1999 | Summicron-M | 2.0 | 35 |
| 3868267 | 3868616 | 1999 | Summilux-M | 1.4 | 50 |
| 3868617 | 3869616 | 1999 | Summicron-R | 2.0 | 50 |
| 3869617 | 3869916 | 1999 | Summilux-M | 1.4 | 75 |
| 3869917 | 3870166 | 1999 | Elmarit-M | 2.8 | 90 |
| 3870167 | 3871166 | 1999 | Summilux-M | 1.4 | 50 |
| 3871167 | 3871666 | 1999 | Vario-Elmar-R | 3,5-4,5 | 28-70 |
| 3871667 | 3872666 | 1999 | Elmarit-M | 2.8 | 24 |
| 3872667 | 3873666 | 1999 | Summicron-M ASPH | 2.0 | 35 |
| 3873667 | 3874166 | 1999 | Apo-Extender-R 2x | | |
| 3874167 | 3875166 | 1999 | Apo-Telyt-M | 3.4 | 135 |
| 3875167 | 3876166 | 1999 | Apo-Summicron-M ASPH | 2.0 | 90 |
| 3876167 | 3877166 | 1999 | Elmar-M | 2.8 | 50 |
| 3877167 | 3877466 | 1999 | Summilux-M | 1.4 | 50 |
| 3877467 | 3878466 | 1999 | Summicron-M | 2.0 | 50 |
| 3878467 | 3878866 | 1999 | Summicron-M | 2.0 | 35 |
| 3878867 | 3879366 | 1999 | Elmarit-R | 2.8 | 19 |
| 3879367 | 3879376 | 1999 | Super-Elmar-R | 3.5 | 15 |
| 3879377 | 3880376 | 1999 | Summicron-M ASPH | 2.0 | 35 |
| 3880377 | 3880746 | 1999 | Summicron-M | 2.0 | 50 |
| 3880747 | 3880946 | 1999 | Summicron-M | 2.0 | 35 |
| 3880947 | 3881946 | 1999 | Apo-Summicron-M ASPH | 2.0 | 90 |
| 3881947 | 3882246 | 1999 | Summilux-M | 1.4 | 50 |
| 3882247 | 3882996 | 1999 | Vario-Elmar-R | 3,5-4,5 | 28-70 |
| 3882997 | 3883246 | 2000 | Elmarit-M | 2.8 | 90 |
| 3883247 | 3883746 | 2000 | Elmarit-R | 2.8 | 24 |